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November 17, 1888.

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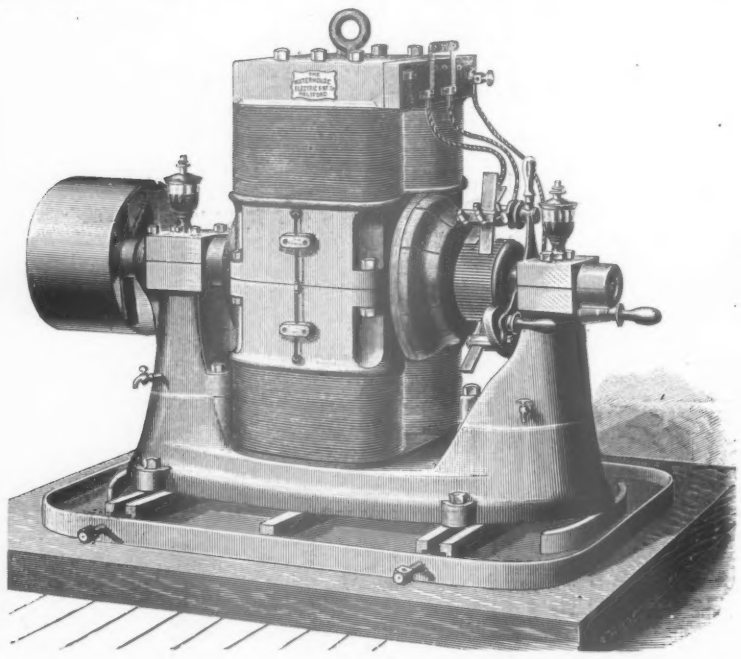
The Waterhouse System of Arc Lighting

HAS WON THE LAURELS.

WHY?

For Submitting to Tests that would Destroy the Apparatus of any other System.



AWARD:

GOLD MEDAL,

MECHANICS' FAIR,

BOSTON.

DECEMBER, 1887.

AWARD:

GOLD MEDAL,

Two Silver Medals,

CENTENNIAL EXPOSITION,

Cincinnati, October, 1888.

Extract of Judges' Report,

MECHANICS' FAIR, BOSTON.

"The most striking feature of the Waterhouse Dynamo is the efficiency of its self-regulating arrangements, which are purely electrical in their operation without the aid of mechanical devices; and the efficiency of this method of regulation was shown by varying the number of Arc Lights in circuit from the full complement of the dynamo to none; and also short circuiting the dynamo by placing a wire between the binding posts.

"This was accomplished without producing any visible change in the illuminations from the remaining lamps or sparking at the brushes."

THE SAME TESTS WERE MADE AT CINCINNATI.

INSTANTANEOUS AUTOMATIC REGULATION AHEAD.

THE BEST ARC LIGHT IN THE WORLD

IS MANUFACTURED BY

The Waterhouse Electric & Mfg. Co., Hartford, Conn.

ELECTRICAL REVIEW

ILLUSTRATED.

A WEEKLY JOURNAL OF

Electric Light, Power, Telephone, Telegraph and Scientific Progress.

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Politics and Electricity.

ELECTION RETURNS AT THE ELECTRIC CLUB RECEIVED BY OVER THREE HUNDRED PERSONS—AN EVENING OF SOCIAL AND, TO SOME, POLITICAL ENJOYMENT.

Not since the opening night have the handsome parlors of the Electric Club been so crowded with members and their invited friends, as on the evening of Tuesday, November 6th. It had been announced that the election returns would be received at the Club, and this brought out a large attendance of the New York members as well as many from other cities, some of whom had paired off, and others who had taken the train for New York immediately after casting their votes. The first part of the evening the applause over the returns indicated that the electrical gentlemen present were about evenly divided, but as the evening passed away and the returns became more encouraging for the Republicans, the number of Democratic members became less and less, while the Republican side was largely increased by later comers. A few of the faithful, notably Dr. Moses, Frank Stone and A. H. Patterson, remained until the last Western Union bulletin was received, and took the joking of the large majority of Republicans present with the good humor of old politicians.

The returns were received so promptly and reliably—through the great work of the American Telephone and Telegraph Company (long-distance telephone), and the Western Union Telegraph Company, both companies having generously supplied the Club without charge—that the Club early in the evening became one of chief points of interest, and presented an animated scene long after midnight; in fact, it was 5 A. M. Wednesday before the last Western Union bulletin was received, and it found several members still there to read it.

Capt. W. L. Candee and Dr. Otto A. Moses were the presiding officers of the evening, and took turns in announcing the bulletins. Both gentlemen possess admirable voices. The telephone company supplied a number of large blank posting sheets, on which the returns were written and posted up in the front parlor, where also was located the long-distance telephone, in charge of a competent operator. The race between the telephone company and the telegraph company was pretty even, the messages of the latter company being forwarded with wonderful quickness from the 23d street station. The telephone company was the first to announce the complete returns from Brooklyn City, and on two or three other occasions distanced its older rival, the telegraph. Before the members departed, an enthusiastic vote of thanks to both companies was unanimously adopted, and the secretary of the Club requested to so inform them.

At intervals between the receipt of election bulletins, music, songs and recitations comprised enlivening features of the informal programme. Mr. Wm. S. Hine sang a number of songs in his usual splendid style and was loudly applauded. Messrs. Hutchings and Peet, visiting friends of Mr. E. E. Bartlett, also favored the Club with several fine selections. A number of chorus songs were also rendered, led by Messrs. Hine, Toppan and others, the Club developing a number of good singers. Mr. Geo. M. Phelps rendered several fine piano selections. Mr. H. Ferguson Cowan, of England, who was present as the guest of Mr. F. Maguire, assisted greatly in the pleasure of the evening by his remarkably fine whistling and was encored again and again. Dr. M. Rynear recited two interesting selections that brought forth applause from all.

Mr. E. M. Hamilton, one of the Club's enthusiastic members, had kindly secured a number of very elegant paintings for the parlors, which were hung Tuesday afternoon. These beautiful paintings, along with those that other members have presented the Club, made the parlors most attractive, and astonished many members from older and leading New York clubs who visited the Electric Club for the first time that night.

Through the kindness of Mr. Chas. A. Cheever, of the Metropolitan Phonograph Company, two phonograph-graphophones were on exhibition and were a center of interest all evening. Mr. Thom had the instruments in charge, and all who desired were privileged to record their voice and then listen to it as repeated back.

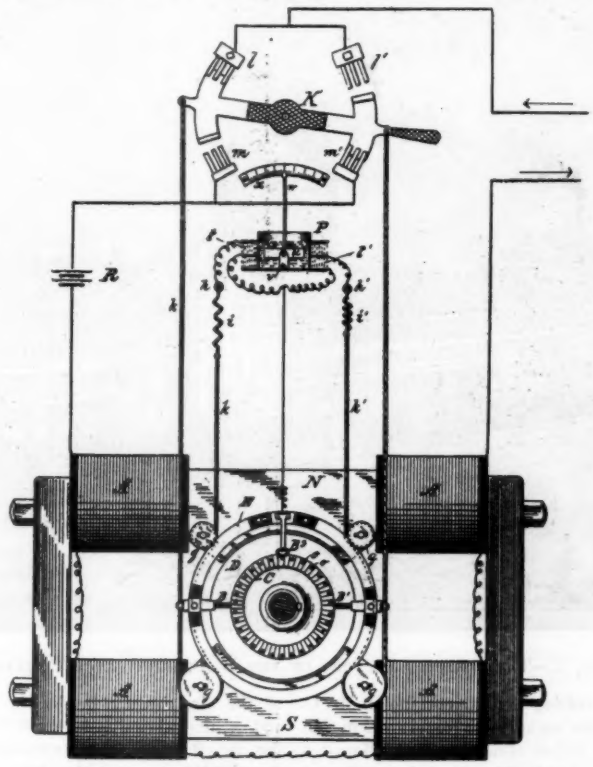
The attendance was quite large, as before stated. There were gentlemen present from Chicago, Baltimore, Philadelphia, Hartford, Boston and several other cities, and the New York members were present in full force.

Thursday night of this week (November 15th) the regular monthly meeting of the Club will be held. Dr. M. G. Parker, of Lowell, will deliver the address. Amendments to the constitution and by-laws will also be voted upon slightly increasing the dues.

Field's Automatic Brush Indicator for Dynamos and Motors.

This is a very ingenious device lately patented by Stephen D. Field, of Stockbridge, Mass., the pioneer of the modern electric railway.

In all dynamos and motors whose armature is a closed circuit touched at two points by collecting brushes, a point can be found on the commutator which equally divides the rise of potential if a dynamo, and the fall of potential if a motor, between the positive and negative brushes. Whether this point is midway between the brushes depends on various circumstances—such as the relative strength of magnetism between the field and armature core, the character of distribution of the lines of force, etc. This point being found, a light brush is arranged to touch the commutator thereat, and affords a point of departure for two opposing circuits to the respective brushes. In these two circuits are placed the coils t t' of a differential galvanometer, whose needle is hung in oil, and whose pointer stands normally in a vertical line.



FIELD'S AUTOMATIC INDICATOR FOR DYNAMOS AND MOTORS.

As long as the two currents in coils t t' are exactly equal the pointer w will stand vertical; but the slightest excess in either coil due to a preponderating fall of potential between its terminals arising from a change of density in the lines of force at its corresponding portion of the armature, will instantly deflect the pointer w to one side or the other. The polarities are so arranged that the pointer will move in the direction in which the brushes B B' are displaced. This at once not only indicates the fact that brushes B B' need adjustment, but shows the direction in which they should be moved to restore them to sparkless position. A scale, x, is placed behind the pointer, and is preferably calibrated and marked to indicate in small fractions of an inch or meter the amount of displacement, or the arc of movement to be given the adjusting-lever to restore the brushes B B' to their proper position.

The needle is so sensitive that it will readily indicate displacement of the brushes amounting to only the one-hundredth of an inch.

Personal.

Mr. Theo. N. Vail, president of the Metropolitan Telephone and Telegraph Company, has gone to Europe on a short visit.

Mr. H. Ferguson Cowan, of England, is visiting this country, and was a welcome visitor at the Electric Club the night the election returns were bulletined.

Mr. W. J. Morrison, formerly with the American Company, has accepted the eastern agency of the Ft. Wayne Jenny Company, and will make his headquarters in New York City.

Mr. Frank G. Beach, the able general superintendent of the Central Union Telephone Company, was among the Chicago visitors in the city last week. Mr. Beach has many warm friends in the metropolis, where he at one time resided.

Mr. W. H. Cole, who has been so actively connected with the Virginia Electric Light and Power Company, Richmond, has resigned, and opened an office as contracting electrical engineer in New York, at 775 Tenth Avenue.

Mr. W. J. Osborne, the gentleman who died of heart disease while parading with the Republicans the Saturday before the election, was a member of the Electric Club, and was interested in a number of electrical companies. He had a number of electrical friends, who will greatly regret his sudden death.

The Electric Club Ahead of All.

The two electric companies—the Long Distance Telephone and the Western Union—evidently vied with one another in getting the election returns to the Electric Club first. Time and time again, members, after listening to announcements of the returns at the Club, when going out to the political headquarters in that vicinity, would find the crowd still ignorant of the facts already reported at the Club.

It was proper that the electrical headquarters of the city should be the first to secure the returns, for without the aid of electricity the result of the election would not yet be known. Hurrah for electricity and the Electric Club!

The Massachusetts Auxiliary Fire Alarm Company has been thoroughly re-organized, and the new life infused is pushing the already extensive business of the company. The Rogers system, controlled by this concern, has received the approval of the fire department of the city of Boston, and also of the board of underwriters, and a new circular, just issued, presents strong letters of recommendations from users of the system in Boston and elsewhere, including communications from the proprietors of Young's Hotel and the Parker House, where the benefits of the apparatus have already been practically realized. Mr. G. E. Hitchcock is president of the re-organized company, J. E. Leach, its treasurer, and G. W. Daniels, its general manager.

The American Waltham Watch Factory.

A steam car ride from Boston of 25 or 30 minutes on a recent morning over the smooth steel rails of the Hoosac Tunnel route, and your correspondent was landed in the thriving city of Waltham. A carriage in waiting at the station conveyed him around the public squares, and thence across the smoothly flowing Charles River, and along its thickly settled banks for perhaps one-half a mile, and suddenly there came in view, the immense buildings of stone and brick, symmetrically arranged, two tall towers, rising higher even than the smoking chimneys, and the whole surrounded by well-kept lawns, shade trees and flower beds. This is the largest watch factory in the world, the oldest in the United States, and one of the most perfect in every way yet devised by human genius—the works of the American Waltham Watch Company. The present buildings, shown in our first illustration, have a frontage of nearly 800 feet, with wings and connections forming a labyrinth in the rear. As a matter of interest, we also present a view of the factory as it appeared in 1853, the contrast expressing better than words, the wonderful growth of the industry during the intervening years.

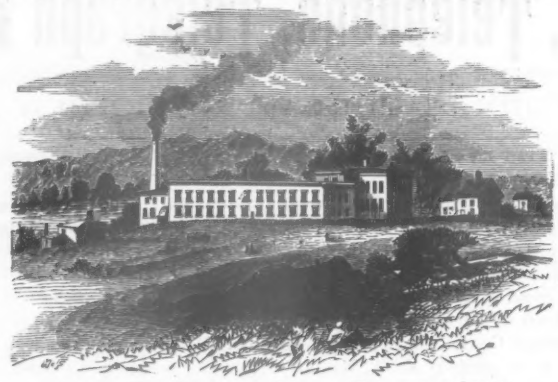


FIG. 2.—THE WALTHAM WATCH FACTORY OF 1853.

Within those walls are now employed over 2,600 persons, each doing his or her special work, the aggregate resulting in the large daily output of those watches which are so popularly known and have given to the Waltham Company their enviable reputation.

The visitor is first ushered into the substantial treasurer's office at the extreme left of the buildings, where are also the directors' room and book-keeping department. A short walk from this building along a corridor, on each side of which are the various rooms of the supply department, brings one to the main stairway, in the first tower. Ascending a flight, the dial department is entered, and the visitor put temporarily into the charge of Mr. Charles Moore, the foreman, who in a courteous and business-like way proceeds to show him the work being done by the 80 men in his department who are engaged in the 60 or 70 separate operations which are there carried on. Here, and in fact through the entire factory, one is impressed by the superior intelligence and refinement of the operatives. From the very nature of the work, they must be of a high grade and able to acquire superior skill in their own particular branch. In this connection it is interesting to note the large number of employés who are identified with the public affairs of Waltham. One of the foremen is now serving his second term as Mayor, several operatives are Aldermen, and the company is also represented in this way on the School Board, Board of Health, Board of Water Commissioners, Commissioners on Drains and Sewers, Public Library, Fire Department, and in fact almost every branch of the city government.

Space will not permit a minute description of a most interesting trip through the various departments, where with the same uniform courtesy and politeness, the foreman explained the steps accomplished under them by which the complete watch is built up. Suffice it to say that the photo dial room under Mr. E. L. Hull, an artist of reputation; the plate or frame department in charge of Mr. Leonard Green; the train room, where Mr. Martin Thomas directs the efforts of over 300 skilled working people; the train cutting department under Mr. C. R. Hill; the escapement room, where Mr. F. Fisher, before alluded to as the Mayor of the city, is in charge; the balance department, Mr. J. L. Keyser, foreman; and the hair spring and main spring departments, presided over by Mr. John Logan, were visited and enough interesting and instructive information gathered in each, to make a separate article.

Taking a short recess at noon, I stationed myself in the office of Capt. Saunders, the door-keeper, to witness the out-pouring of the operatives for the mid-day meal. Exactly on the second the captain rings 32 bells simultaneously in the various departments and a deafening roar precedes the clearer sound of the thousands of foot falls on the stairs. After a bountiful repast presided over by Mr. E. A. Marsh, the master mechanic of the company and inventor of several marvellous automatic machines, there in use, and attended by Mr. H. E. Duncan, manager of the non-magnetic watch department, Mr. D. W. Eldridge, chief inspector, and Mr. Frank Ridlon, in addition to the newspaper representatives, the trip of inspection was resumed.

An interesting feature of the afternoon's sight-seeing was the power and lighting plant.

Some years ago, when the plan of lighting by the use of incandescent lamps was first being demonstrated as practical, it was suggested to one of the authorities of the American Waltham Watch Factory, that it might be a good thing to adopt in the factory as a relief from the poor ventilation and excessive heat resulting from the employment of gas as an illuminant. The peculiar requirements of the factory demand a separate light for nearly every person, and with the large number of persons employed in single rooms the inevitable result was the rapid consumption of the oxygen and consequent vitiation of the air, causing headaches, uneasiness and a general indisposition to work. At that time it was thought impossible to utilize electricity because of the fear of magnetic influence upon watches; since that time it has been found that such fears were without foundation, and five years ago the company put in a 200 light Weston dynamo, giving the light to those departments which had suffered most severely from the evils of gas light. From the first the light was a success, the temperature lowered 20 degrees and, of course, the atmosphere kept more pure. Naturally the other departments desired to enjoy the same advantages, but the limit of the power plant of the factory was about reached.

In the fall of 1887, however, a trial was made of the storage system by putting in 300 cells of Julien Storage Battery, using the 200 light dynamo to charge the battery during the day-time and in the evening on direct lighting; obtaining, in connection with the storage, about 700 lights.

The results proved very satisfactory, and during the past summer the electric plant has been greatly enlarged. Four Mather dynamos, each of 500 sixteen c. p. lamps capacity, and of new improved pattern, were installed, a special dynamo room being built for their accommodation. The boiler capacity was also much enlarged, and a new Corliss engine, the exact counterpart of the one in use for driving the machinery, added. The two can be run connected or disconnected, or alternated without any disturbance to the uniform speed of the shafting, an advantage obtained by the use of two friction clutches made by H. N. Bates & Co., and of great value. The four Mather dynamos are each complete in themselves, and provided voltmeter, ammeter, rheostat, etc., and are so arranged by a system of switches, that one may be used for charging the storage cells, while direct current is taken from the others; all can be used in charging, or all can be used in direct lighting; the current can be sent to any or all of the 20 departments, some getting direct current, some from the storage cells, and any room can at any time be lighted without running the machinery. This switchboard is complete in every particular, and a fine piece of work, reflecting great credit to the Mather Company.

The power plant complete now consists of six horizontal tubular boilers, aggregating 550-horse power, two Corliss engines, 320-horse power. One seven-horse portable engine and three ten-horse power upright engines which are to furnish power for the manufacture of fuel gas by a new and improved process. In the electric plant are included the four Mather dynamos already alluded to; a United States dynamo, 200 lights capacity; a Maxim dynamo, supplying a single arc light used in photo-printing where the electric light is most essential; two Weston and one Wallace dynamos for nickel plating and gilding; and the 300 Julien cells. An electric time signal system gives the vibrations of the pendulum of the astronomical clock, in all departments where watches are timed. Electrical connection is made from every department using power, with a gong in the engine room where there is also an electrical tell tale giving the height of water in the water tanks in the towers. A complete telephone system with central office, switchboard, ten lines and thirty instruments, is installed in the factory, beside, three telephones on the regular suburban exchange. An electric watchman's clock or time detector is also in use, and the doorkeeper has electrical connection with gongs in every department which he rings simultaneously by the movement of a single switch, announcing the instant for beginning and stopping work, the effect of which has already been noted. The gongs are also used for giving the city fire alarms in the buildings; the chief engineer and many assistants and firemen are among the operatives.

The Waltham Company early appreciated the need of reliable watches so constructed as to be proof against the demoralizing influence of powerful magnetism generated by dynamo machinery, and have bent their best energies to the solution of the problem presented in the construction of a non-magnetic watch. The difficulties in their way were many and perhaps not generally realized, but they state these have been surmounted and an American non-magnetic watch has been attained. During

FIG. 1.—THE PRESENT FACTORY OF THE WALTHAM WATCH COMPANY.

the afternoon the chief inspector of the company, Mr. D. W. Eldridge, made some very interesting tests with the non-magnetic hair springs. He stretched out the coiled spring to its full length and on releasing, it returned to its original coil, showing a remarkable elasticity. A second test was to heat the spring to a low redness and then pull out a five-inch length as before. On its release, it again returned to its original coil without showing the least effect of the treatment to which it had been subjected. These tests seem to fully refute statements which have been made that after a wire has been thoroughly demagnetized and subjected to heat, it will "cup" and will not return to its original position when stretched.

At some future time we hope to present in the columns of the REVIEW illustrations of those parts of works which are of special interest to the electrical fraternity.

Those REVIEW readers who listened to the very interesting paper by Mr. S. S. Leonard, of Minneapolis, on "Petroleum as a Fuel," which was read at the last meeting of the National Electric Light Association, will be interested to learn that the American Waltham Watch Company are making extensive preparations for obtaining from gas all their heat required for their numerous furnaces for melting, tempering and annealing of metals and the making and applying of enamel for watch dials, and also for firing their 500 horse power engines.

Chicago's Old Fire Bell.

The Chicago *Inter Ocean* says: When Prof. Barrett, the city electrician, was ringing the old court house bell during the war of the rebellion, he walked every night through the grim old building and up the 129 iron steps to the tower, 165 feet high, and watched over the silent city for fires. It was very, very lonesome up there under the stars and under the storms. The old court house stood in the centre of the spot occupied by the present building, and if a man cried "fire" at the corner of Chicago and Milwaukee avenues, the professor declares solemnly that he would hear him. Once in a while a friend would sit up with the professor but he had one visitor who never failed to come up when the bell tolled midnight. With this visitor he always shared his lunch. It was a rat, almost as large as an ordinary cat. Although the professor was very fond of the rodent, he never fondled it. It perished, poor old fellow, with thousands of its fellow creatures in the great fire of 1871. The night the most people were in the tower was when midnight services were held there in honor of Abraham Lincoln, the martyred president, whose remains lay in state in the wide corridor beneath. Thousands of people viewed the body by night and by day.

When a fire occurred a red lantern was hung out denoting the direction. The great bell, the tones of which could be heard as far as the town of Lamont, was sounded eight times. Then the number of the district was given. One night the professor was relieved by an old German. He was ringing the bell for all he was worth when the professor ran up the steps breathlessly. "Where is the fire old man?" he asked.

"Can't you see it over yonder?" exclaimed the German, pointing to the east. Barrett thought he would break his heart laughing. The old man had caught a "still" on the moon which was just rising over the Illinois Central Depot.

Prof. Barrett, has in the archives in the repair shop, a few relics of those old days, among which is one of the badges of the ancient "Bell Ringer."

Will the Manufacturer Please Send Us His Address?

TO THE EDITOR OF ELECTRICAL REVIEW:

Will you please give me the address of the party who manufactures apparatus for tempering steel ribbons and steel wire by electricity? As I have heard of the process, it consists in heating the ribbon while under the surface of oil, thus giving it an oil temper. With a suitable arrangement of rolls, the untempered steel is fed in at one end of the oil tank, and comes out spring tempered at the other end. J. WALTON DYSCEE,

Boston, Nov. 10th.

The Electric Lighthouse at the Copenhagen Exhibition.

A correspondent sends to *Industries* (London), the following account on this subject: A complete lighthouse, with engines, dynamos, and fog signalling appliances, is somewhat unusual at exhibitions; but this may be seen at the Copenhagen Exhibition, the effect of the sweeping rays of the revolving lantern on the buildings and the extensive grounds at once engaging the attention of the visitor. The current for the arc lamp is derived from two De Meritens machines, which can be used either singly or together, according to the degree of illumination desired, the necessary connections being effected at a commutating board.

The most original part of the exhibit, giving, however, the impression of excessive complication, is the arrangement for the fog signal. The sirens (of which one only is exhibited), are supposed to be at a considerable distance from the engine house, and the object aimed at is to control them without leaving the engine room. The air-compressing machinery consists, in the engine room, of a pair of pumps, driven, through the intervention of friction gearing, by the engines and an air receiver. The air is cooled during compression by admitting water into the air cylinders of the pumps, and draining it out by means of a separator fixed to the on the air pipe driving the first air motor to set the siren in action, pressing into his service air, clock work, and electricity, to effect the necessary movements. The whole plant will be erected at Hanstholm. The engines were made by the Helsingfors Iron Ship and Engine Company, and the electrical valve regulators by Messrs. Kemp & Lauritzen, of Copenhagen.

Electric Lighting in Vienna.

The use of accumulators, in public and private electric light insulation in Vienna, is rapidly extending, and especially is this the case with the particular type of storage cell devised by Farbaky-Schenek. A battery consisting of 56 cells is exhibited at the Jubilee Exhibition by Messrs. Götz & Odendall; the cells have a capacity of 300 ampere hours, and are intended for a normal discharge of 50 amperes during six hours. This battery has been at work since the 8th July, lighting a restaurant at the Exhibition, and no interruption whatever has taken place during that time. Each box contains eleven plates, and weighs when filled 170 lbs. Farbaky-Schenek accumulators are also used in connection with the lighting of the new Burg Theatre, where cells of 600 ampere hours capacity are used, three such cells being coupled parallel. Each cell has a normal discharging current of 100 amperes during six hours.

FIG. 3.—A DEPARTMENT IN THE WALTHAM WATCH FACTORY.

delivery pipe. At the siren station there are two more air receivers of unequal size. The siren is supplied from the smaller receiver, which takes its air from the larger, a reducing valve between the two keeping the pressure in the smaller receiver at four atmospheres. If the siren is at work, both pumps can deliver into the large receiver at a pressure of about four to five atmospheres. When the siren is not required, the pumps are thrown out of gear after having raised the pressure in the large receiver to 12 atmospheres, so that the siren may be started at a moment's notice in the event of a fog coming on suddenly. To obtain this pressure the pumping is done in two stages. One of the two pumps delivers into the receiver in the engine room, and the other takes the air from this receiver and forces it on to the large receiver at the siren station. From the engine room air receiver a small pipe leads to a small air engine, which can be started or stopped by a valve. This engine drives a small dynamo, supplying current by two leads to the siren station. In the circuit is interposed a contact-breaker driven by clock work, making and breaking contact at regular intervals. The receiving apparatus in the siren station consists of an electro-magnet, the armature of which controls an apparatus driven by an air motor supplied from the small receiver. This apparatus actuates a valve which opens the connection between the small receiver and the siren, and also supplies air to another valve, which controls the passage of air between the large air receiver and the small one. It will thus be seen that the engineer in charge has only to open the little valve

On the 6th inst. there took place on the Northern Railway of Austria a trial of a portable electric lighting plant similar to that recently illustrated in *Industries*. The whole apparatus required for the lighting is placed on a wagon, and the time occupied in putting up the plant was only two hours, a speed never before accomplished.

The Electricitats-Maatschappij (Khotinsky's system) has obtained an order for the electric lighting of the Passage St. Hubert, at Brussels. There will be five hundred 16 c. p. glow lamps, the lights to be paid for at the rate of ½ d. per lamp hour, a minimum of 15,000 hours per lamp being stipulated. The arrangement is to last nine years. For this installation there will be employed two Thury dynamos and a battery of accumulators. One of the dynamos and the accumulators are at present at the Exhibition. The dynamos will be driven by two vertical steam engines of 50 h. p. each, and steam will be supplied from two boilers. The municipal regulations do not allow of boilers of more than 50 h. p. being used in this place; and this is the reason that the power has had to be sub-divided. The Thury dynamos are of 150 volts and 175 amperes capacity, the speed being 400 revolutions. The battery will consist of 174 cells, subdivided into three paralleled groups during charge and two groups during discharge. The capacity of the cells is 200 ampere hours. The accumulators have been working very well during the whole time of the Exhibition. Trials of the electric light have been made at Namur, in the presence of the Communal Administration and have been very successful. The actual installation will be carried out by M. Largrades. At some trials made at the Exhibition by M. Dulait with the Adam gas engine, it was found to run exceedingly regularly; and the engine, which was nominally of 12 h. p., actually developed on the brake 13½ h. p.—*Industries*.

Florence, Ala.—The Florence Dummy Railroad Company, Florence, Ala. W. B. Wood and others, incorporators.

Chicago, Ill.—The Fuel Gas Company, of Chicago. Capital stock, $1,000,000. John T. Hanna and others, incorporators.

Castleton, N. Y.—The McCaslin Machinery Company, Castleton. Capital, $20,000. Chas. W. Hunt and others, incorporators.

Pueblo, Cal. — The Valentine & Grigg Motor Company, of Pueblo. Capital, $250,000. R. Valentine and others, incorporators.

Chicago, Ill.—The National Heating and Ventilating Company, of Chicago. Capital, $10,000. W. S. Brooks and others, incorporators.

Bristol Pa.—The Bristol Electric Light and Power Company, Bristol. Capital, $30,000. Philip Halzell and others, incorporators.

New York.—The Automatic Electric Light Company, of New York, have filed a certificate of incorporation with the secretary of state at Albany. Capital stock, $200,000.

Milwaukee, Wis.—The European Fire Motor Company, of Milwaukee. Capital, $200,000. Henry E. Jacobs and others, incorporators.

Jersey City, N. J.—The Mutual Electric Lighting Company, of Jersey City. Capital, $100,000. S. Marsh Young and others, incorporators.

Birmingham, Ala.—The Southern Electric Company, of Birmingham. Capital stock, $10,000. W. C. Harris, Jr. and others, incorporators.

Buena Vista, Cal.—The Buena Vista Electric Light Company, of Buena Vista. Capital stock, $15,000. H. H. Daniels and others, incorporators.

Ft. Worth, Tex.—The Fort Worth Electric Manufacturing Company, of Ft. Worth, with a capital of $100,000. They will establish electrical works.

Jersey City, N. J.—The Rogers Typograph Company, of Jersey City. Capital, $1,000,000. John S. Sweeney, Detroit, Mich., and others, incorporators.

Phœnix, Oswego Co., N. Y.—The Phœnix Electric Light Company, of Phœnix, Oswego County, capital, $20,000, has filed a certificate with the secretary of state at Albany, last Saturday.

Harrisville, Burlington Co., N. J.—The Harris Paper Company, of Harrisville. The capital stock is $100,000, and $75,000 has been paid in. The incorporators are Howard P. Harris, John W. Harris, and Richard C. Harris, Jr., of New York.

Holyoke, Mass. — A charter has been granted to the Connecticut River Paper Company, of Holyoke, which has a capital of $150,000. The officers are as follows: President and treasurer, L. J. Powers, R. M. Fairfield, John Shepard, C. F. Pulsifer, and L. J. Powers, Jr.

Camden, N. J.—The New Jersey Telephone Company filed articles of incorporation in the Camden county clerk's office on Saturday last, with an authorized capital of $1,000,000, with $1,000 said to be paid in. The incorporators are Godfrey Keebler, John C. Hance, James W. Carson, and Richard M. Pancoast.

Spokane Falls, W. T.—The Electric Motive Power Company, of Spokane Falls. Capital stock, $50,000. Trustees: A. S. Moore, of San Francisco; W. S. Norman and C. R. Burns, of Spokane Falls. Its objects are to manufacture and store electricity; to furnish motive power by the same; to operate and maintain motor, telegraph and telephone lines; and to deal in electrical appliances.

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EDITORIAL ANNOUNCEMENT

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☞ No attention will be paid to communications without the *name and address of the writer.*

We invite correspondence from Electricians, Inventors, and the Telegragh and Telephone fraternity and those engaged in Electric Lighting, on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.

We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

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NEW YORK, NOV. 17, 1888.

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The executive committee of the National Electric Light Association has been called to meet at Pittsburgh, Pa., on Thursday, the 15th inst.

The decision of the Supreme Court, announced elsewhere, simply means that the Government may bring a suit to set aside a patent. In this instance, the suit against the Bell patent goes back to the Circuit Court for trial on its merits.

Mr. W. J. Hammer, who made quite a success of the Edison exhibit at the Cincinnati Exposition, will soon go to Paris to take charge of a similar exhibit for the great exposition to be held in that city next year. There will be exhibited a specimen of every one of Mr. Edison's inventions.

The Mann Boudoir Car Company has failed in an attempt to make good its claim for an electric alarm bell from passenger to porter; the same arrangement having long been used on steamboats. It has yet another chance, however. A night alarm bell that would tell the conductor when the porter is puffing at a five-cent Bilschwanger in the windward compartment would be sure to succeed at the Patent Office. It wouldn't be necessary to connect up with the sleeping passengers—their noses would tell them.

Mr. D. H. Louderback, so long and favorably known in the telephone business, has severed his connection with the various interests heretofore under his charge, and has removed from Chicago and taken up his residence at Tacoma, W. T., where he will engage in the smelting business, together with capitalists from St. Paul and elsewhere. To Mr. Louderback's zeal and energy is due to a large extent the thrift and growth of these various enterprises. He was the first to conceive the idea of consolidating the small companies heretofore in existence, into a larger territory, thereby making many properties that had been previously unprofitable, paying investments.

The extension of the Edison incandescent plant into two new sections of New York city is of more than ordinary importance, furnishing, as it does, additional criteria and data for the student and the investigator. Only those who have closely followed the historical part of what might be called the "Edison Era," can form any idea of the ingenuity, the skill, that has been required to make the scheme of incandescent light distribution a practical, as well as a laboratory success Even the powers of an Edison had not been enough to carry out so stupendous a task without the confidence of monied men, for, as in all novel undertakings of this nature, immense preliminary outlays are required, with no hope of returns unless they succeed. Edison inspired the confidence, and this adds almost as much to his fame as his great services to science and to his country.

Some people are hard to please. If a light is small they complain that they can't see, if its large they grunt still. No doubt, when Gabriel blows his trumpet on the last day and they stop in the ante-room to have their halos fitted, if they should be thus rewarded above their deserts, they'll complain that they don't fit them; being too small or sagging too much over their liberal ears. Here's a man writing to the English papers about the great electric light shown from St. Catherine's Point, Isle of Wight. He says its too large and is sure to blind the eyes of the navigators approaching it. It is large, having an illuminating power of 7,000,000 candles; flashing every half minute, and of five seconds duration, being visible from incredible distances, the power coming from three steam-engines of 12 H. P. each, and two magneto electric machines of the De Meritens type. This is a stormy and dangerous coast, and even if the light is trying to mariners close up to it and near sheltering harbors, what matters it if in the tempest and the fog it sends a timely warning to those who, losing their reckoning, are driving inward to destruction!

THE TELEPHONE AND ELECTION RETURNS.

The American Telephone and Telegraph Company won a conspicuous telephonic triumph by its admirable handling of the election returns. A less enterprising company would never have undertaken a task of such magnitude and importance; yet the result proved that the company's facilities were equal to the demand made upon them, and hereafter the long distance telephone will be an important factor in election times. The three doubtful states of New Jersey, New York and Connecticut are comprised in the company's long distance system, and by means of special telephones, either put up at the polls or near by, the returns were telephoned in ahead of the telegraph, bringing the same news. As an indication of the accuracy of the information received by the telephone company, may be mentioned the fact that about 1 A. M. Wednesday, the writer received at the Electric Club the final message from General Superintendent Hibbard, in effect that New York State was surely Republican, New Jersey just as certainly Democratic and that Connecticut was also Democratic, but by a plurality of *less than* 500 *votes*. The final returns, as all our American readers well know, fully substantiated this statement.

We congratulate the telephone people over their success. It was another evidence of the growing importance of this modern method of transmitting intelligence.

NEW BOOKS.

Preparing for Indication. BY ROBERT GRIMSHAW, M. E.

Among the useful little handbooks from the pen of this able engineer, the above is one of no little importance. It gives complete instructions how to get everything in readiness for the important work of indicating an engine, and is designed so as to meet every possible contingency in the way of special forms of engine, and special conditions of location, pressure, speed, and surroundings. Every engineer should have the book, especially those in charge of electric light engines which should be indicated at regular intervals. Published by the Practical Publishing Co., New York. For sale at this office.

OUR CHICAGO LETTER.

(Special Correspondence.)

A novel application of electricity has just been put in operation at Chicago, which is the outcome of another one of Prof. Barrett's practical suggestions.

The North Side Water-Works have recently been made the seat of one of the city's electric light plants, and the buildings are filled with incandescent lamps of the Edison system.

In addition to the wires necessary for this illumination, there are fine cables which extend through the water tunnel to the light house on the inshore inlet. The tower is of iron, of skeleton form, bearing on its top a hexagonal lantern. The lighting apparatus consists of twenty-four 32 candle power incandescent lamps arranged in a circle, with a reflector of silvered glass. This is all suspended from the roof, to prevent vibrations.

Directly beneath the lantern a fog bell, weighing 600 pounds, is suspended, the hammer of which, raised and dropped, strikes the bell a blow eight times per minute. A cam, operated by a "C. & C." one-quarter horse power motor—the latter actuated by current from the water works station—raises and drops the hammer.

The electrical arrangement is such that the load on the motor is held constant.

At the dynamo room switch board individual switches for the lights and motor, enable these to be used separately or together, as occasion requires. The dynamo is driven with link belting by one of the new type of Ideal engines, and the entire electrical plant, fittings for the light house, etc., were supplied and installed by Messrs. Leonard & Izard, Rookery building, contractors for the Chicago Edison Company.

An experienced nautical man, who has seen the lights of many nations, in many lands, pronounces this light house illumination the finest he ever saw.

The city's street plant is getting on finely. The professor says he has set Christmas morning for the lighting.

The lights which will blaze out on that august and glorious anniversary will count up 171, which, added to what is technically known as the river plant, will give the city a total of 271 outside lamps.

The programme of location, which is being carried out as rapidly as possible, will light Van Buren street to Halsted; Madison to Ashland avenue from Michigan avenue; this last thoroughfare from Jackson to Rush street Bridge; East Washington from Lasalle to the tunnel, and on the west side from the tunnel to Halsted; Jefferson street, from Randolph to Van Buren; Franklin, between Madison and Randolph; Clinton; from Randolph to Van Buren.

The lines are so arranged that at any time other streets may be let in by loops, and the plant thus enlarged as occasion requires, and appropriations will permit. Now that the plan is fairly under way there will be no halt, but gradually the wires will be extended, until only the outskirts of the city will be lighted by gas.

Everything pretty much all this week has been dull but politics. These have had the public ear, and abused it, the people's time and patience, wasting the former, and wearing out the latter, until Republicans and Democrats alike are complaining that so much music, and horn, and hoorah, and tramping, is more than a surfeit, and are heartily glad that a presidential election inflicts itself upon us once in four years.

Prof. F. B. Badt, formerly with the U. S. Company here, has a handsome new desk in the Western Electric Company's establishment, which will be his address in future. He is welcomed back to Chicago by his hosts of friends, and is looking well and happy after his seven months' absence. He will have charge of the electric light construction of the Western Electric Company.

The C. & C. motor (Armour, agent), has left the Adams Express building on Dearborn street, and gone into the Edison building at 139 Adams.

Your correspondent, too, has changed his address, and will hereafter be found at the fire alarm office, City Hall.

Electricity prescribed as medicine has been until quite recently, the most abominable of quackery. No matter what the trouble with the human organism, when other remedies failed, the baffled physician recommended 'lectricity, and the "universal shocker," which was cheap, powerful and mysterious, was at once set to work.

The differences due to volts, to coulombs, amperes, reversals or constant flow, whether this or that direction should be given the current through the system was, as Mr. Toote would say, "of no matter of consequence." It provoked a sensation—it must therefore cure.

The epidemic is over, thank heaven, but sporadic there are still cases of this quackery. In the mean time a better, healthier condition of affairs has taken the place of the former state of things.

An institute of medical electricity has just been opened at 24 A, Regent street, London. The institute is furnished with the best and most complete electrotherapeutic apparatus and of course the entire establishment is lighted by electricity.

The founders of the institute are well-known electricians who are encouraged and counselled by the highest authorities in medicine, and especially in this particular branch. The enterprise is based on pure scientific principles and is intended to create an establishment capable of giving electrical treatment, directed by the best of medical skill and knowledge, at a minimum cost. The list of physicians attached to the institute, as lecturers and operators, embraces names of well-known savants in both electrical and medical science. A branch establishment has already sprung up at Southsea.

One of Chicago's telegraph operators, Mr. Will Joyce, of the Tremont House, felt so confident of Cleveland's election that he and the news stand merchant made what is sometime called a funny bet on the general result. The penalty was five kicks to be bestowed on the loser, by the winner. On Friday the wager was paid in the rotunda of the hotel. Joyce took his medicine like a little hero, turning one or more almost complete handsprings and performing other acrobatic feats, during the rendering of the play. He expects to take his accustomed seat at the table in about two weeks.

Chicago, Nov. 10, 1888. C. C. H.

OUR BOSTON LETTER.

(Special Correspondence.)

Politics and election excitement have been felt in the electrical as well as all other lines of business, and here, as well as elsewhere, while the news pleases many, there are also some long faces among electrical people, and depleted purses tell the tale of money placed on the losing side. On account of the big Republican procession Monday evening, the meeting of the Electric Club was postponed one week. On Tuesday evening the club rooms presented a scene of excitement. Through the kindness of Messrs. Roche and Pettengill, managers respectively of the Western Union and United Lines, special instruments were placed in the club rooms, and the first messages taken by Mr. W. J. Denver, general manager of the N. E. Tel. Company and first vice-president of the club, and Mr. John C. Wilson, of the Municipal Signal Company, and both old-time telegraphers. Later, the regular operators, Messrs. Gillespie and Bagley, took charge, and cheer after cheer was given, accompanied by the waving of flags or bandannas, as the case might be, as the returns were read.

A large delegation from the Thomson-Houston Electric Company, and the Thomson Electric Welding Company, of Lynn, which had been in attendance at the Boston Theatre witnessing Kiralfy's "Mathias Sandorf," arrived about 11, preceded by their euphonious cheer of "Rah, rah, rah! Rah, rah, rah! Thomson! Houston! Rah, rah, rah!" and led on by Mr. A. L. Rohrer, with the flag of our country, and Mr. O. K. Steuart, waving a red bandanna. Each member of the delegation was provided with a monogram metal badge of handsome design and artistic finish. Later in the evening, Mr. Rohrer presented to the club in behalf of the men of the two companies, an electrically welded cane, which was accepted on behalf of the club by Mr. H. B. Cram. The cane consists of 14 pieces of one-fourth inch copper wire, electrically welded, and with twisted head. Silk-covered cable copper wire, with two large balls pendant, serves for decoration. A collation was served all the evening on the upper floor, and the hospitality of the club liberally enjoyed by visitors and members.

The regular meeting of the Society of Arts was very largely attended Thursday evening when Mr. H. W. Haughan, of Providence, exhibited the phonograph and phonograph-graphophone. Prof. Charles R. Cross, of the Institute of Technology, presided and prefaced the remarks of Mr. Haughan with a very interesting explanation of the acoustic principles involved in the operation of the sound reproducing machines, which could have been extended agreeably to the audience over a much longer time. Mr. Haughan confined himself to a very general description of the apparatus after which an opportunity was given for all to personally examine and test its workings. Both phonographs and phonograph-graphophones were exhibited, some run by foot power, some by "C. & C." motors from the incandescent circuit in the building and from battery jars. The familiar face and form of Dr. Oliver Wendell Holmes was among the auditors, and the electrical interests of the city were also well represented.

That the Cambridge Aldermen gained wisdom by their recent investigations of the Thomson-Houston electric street railways in Washington and elsewhere is shown by the following note from that city:

"At a regular meeting of the Cambridge Board of Aldermen Wednesday evening an order was adopted granting the West End Railway Company authority to construct and maintain the overhead electric system of railroad in North avenue and Main street, from Arlington to Boston, provided the poles are erected along the side of the street and under certain other conditions."

The Excelsior Co. have opened an office at 620 Atlantic avenue, and intend to push their business in this vicinity, especially in the line of arc motors.

The Thomson-Houston International Electric Co. has established a New York office at 115 Broadway. Mr. L. J. Magee will be in charge and will divide his time between New York and Boston.

November 12, 1888. T. W. S.

Electrical Election Notes.

There are a number of shiny silk hats sported in electrical circles. A conspicuous one is worn by Baker, of New Jersey, who pinned his Republican faith to National results and wisely passed over his native state.

J. W. Godfrey, the Grimshawite, is said to be negotiating with Knox for wholesale rates, so as to be able to supply his Republican friends without having to mortgage his house.

John A. Seeley, the popular electrician, was such a sanguine Harrison man that his Democratic friends looked upon him as an easy prey. He is now over a thousand dollars richer and has hats enough to supply a half dozen friends for a year.

A. Harrison Patterson, strange to say, was a Cleveland man. Having wagered a hat a day for a month, he now thinks he will have to go bareheaded, if not barefooted, the next six months.

The secretary of the Electric Club named the four winners—Harrison, Hill, Grant and Flack—asked for by the *Evening Sun* and is consequently richer by one dollar.

W. H. Johnstone, the conduitite, is reported as winning largely.

Several of the members of the Electric Club are members of the County Democracy. It is impossible to get any of them to talk about politics—they even express doubt as to whether there has been an election.

H. L. Storke, the gallant and popular Democrat, would feel very sad indeed over the result did not his philosophical mind permit him to realize that the winning party this time took pretty good care of the country for twenty-four years.

T B. Doolittle can't see anything funny in the result of the election, but points with pride to his State of Connecticut, where 300 plurality gave the electoral vote to President Cleveland.

Angus Socrates Hibbard is one of the happiest of telephone men. His side not only won, but the long-distance telephone was the first to announce it.

Vice-President and General Manager E. J. Hall consoles his political defeat with the thought that his American Telephone and Telegraph Company covered itself with glory in announcing the election returns, and secured a reputation thereby that will greatly increase its value and public appreciation.

W. Dennis Sargent, of Brooklyn, is now convinced that one of his neighbors is a political prophet—and had he followed the prophet's advice he would have been on the winning side.

Col. W. W. Goodyear and a Democratic friend became convinced from the early bulletins that the election was all right, and proceeded to celebrate a great Democratic victory. When the news reached them the next morning, their disappointment was lessened by appreciation of their wisdom in celebrating so promptly.

Judge John Rooney, a Brooklyn member of the Club, was an enthusiastic Republican worker, and made some forty campaign addresses in this city, and had the satisfaction of seeing his party's vote greatly increased.

Messrs W. A. Hovey and H. B. Thayer are deserving of much praise for their successful handling of the press bulletins for the long-distance telephone company. The work would have pleased Thayer better had he not been compelled to report those ever-lasting Harrison gains.

President Stockton of the American Bell Telephone Company, with a number of friends, received the election returns at his Boston residence, the long-distance telephone being used. The returns reached Mr. Stockton in a very few seconds after they were received at headquarters, and were so prompt and accurate that every one present was surprised.

Harrison D. Stanley, of Bridgeport, will soon blossom out in a new suit of clothes, paid for by Democratic money.

Henry Hine was one of the most enthusiastic Harrison men of the Electric Club, and remained long enough to be convinced that he was on the winning side.

Norman McCarty came in from Baltimore to rejoice with other enthusiastic Republicans. Cleverly came over from Philadelphia, but wasn't able to rejoice very much.

Among the first to decide that Harrison was elected was Mr. T. C. Crawford, the well-known journalist, who left the Club at 11 P. M., convinced that Mr. Cleveland had suffered defeat—and because of his tariff message.

The U. S. Supreme Court Says the Government Can Go On With Its Telephone Suit.

Justice Miller, of the Supreme Court, rendered a decision last Monday in the suit of the United States against the Bell Telephone Company, brought to Washington on the appeal from the decision of the Circuit Court of Massachusetts sustaining the demurrer entered by the Bell Company to the Government's suit.

Justice Miller has decided that the plea of multifariousness sent by the Bell Company does not hold good, and also that the Bell Company's contention that the United States has no right to bring a suit to set aside a patent is not good.

The decision is in favor of the United States. Justice Miller overrules the decision of the Circuit Court of Massachusetts, and the Court remands the case with instruction to entertain the Government's bill.

The regular monthly meeting of the Electric Club to be held Thursday night (November 15th), of this week, is an important one and should be largely attended. The lecture by Dr. Parker promises to be particularly interesting and treats of the timely topic of "Lightning," a subject that was exhaustively discussed at the recent meeting of the British Association.

An Interesting Electric Light Plant.

Some weeks ago the REVIEW published a brief description of a job of incandescent work being done by Mr. W. H. Cole for the E. L. Striker estate, in this city. As it is rather a new departure in electric lighting, and the work is giving such satisfactory results, a more detailed description will be of interest.

Up to the present time, the question of furnishing electric lights, steam heat, and hot water to the tenants of flat houses, where the rent is to be from $14 to $24 per month, flats of from four to seven rooms, has never been practically carried out. There is necessarily a heavy outlay to commence with, and a feeling of uncertainty that prevails with the average landlord and builder on account of poor results, and the heavy expense to maintain some of the work that has been done, makes them timid about investing in that direction. The tendency, too often, in constructing electric light plants is to do it cheaply. It is generally contracted for at a very low price under competition, and there are so many chances to do poor work, furnish cheap material, and cover it all up, that the temptation sometimes cannot be resisted. The result of this is not only a poor service, caused by a poorly balanced system of wires and bad insulation, but the apparatus is under continual repairs, often very expensive.

Mr. Striker has happily "steered clear of these snags." He has put up in his new block of buildings on Tenth avenue between fifty-second and Fifty-third streets, this city, a plant for electric lighting and steam heating that has no duplicate in this country.

It consists of two 125 horse power boilers with Jarvis settings complete. Either of the boilers will furnish steam to run the two "Straight Line" engines, which furnish power for the dynamos.

By the use of these settings they are able to burn refuse and cheap fuel. They are probably furnishing steam as cheaply as any set of boilers in the city. Mr. Cole has made a series of careful tests, and expresses himself as being surprised at the results, even where he expected to do a little better than the average.

The two straight-line engines are each of 75 horse-power, set on solid foundations, and run two Westinghouse direct current dynamos, each having capacity to run 600 lights of 16 full candle-power.

The engines run with a back steam pressure of four pounds, caused by the exhaust steam being used for steam heating. The Westinghouse dynamos are of the latest type of direct current machines, and run their full load without heat or spark at the commutator. Their speed is 900 revolutions per minute, and both engines and dynamos run almost noiselessly.

The power is transmitted from engine to dynamo with 12-inch cotton leather belts, and they do their work noiselessly and satisfactorily. Not a vibration can be felt, or a sound heard outside of the engine room, caused by the running of the machinery. The water is pumped into the boilers by two compound Worthington pumps, which also pump the water into the seven large 50,000-gallon tanks on the tops of the buildings.

Situated at the end of the engine room is a switch board especially designed by Mr. Cole. The feeders from each of 15 houses run to this board and complete control is thereby had of each house. Anyone of them may be cut in or out. The usual arrangement of volt meters and ampere meters are on the switch boards, as well as regulators for the dynamos, although the latter are not needed very much, as the machines are worked to a certain extent automatically.

Each basement has another switch board placed under lock and key, into which the feeders from each flat and the halls are run. This enables the electrician to turn off or on the lights in each flat. All of the switch boards are thoroughly and carefully fused, as well as every branch block and chandelier in the houses. Only the very highest class of insulated wire has been used, and the utmost pains have been taken in placing it in the buildings. The calculated loss on the lines from dynamo to lamp is three per cent. when all of the lights are on.

Every kitchen is supplied with hot and cold water as well as the bath rooms. The hot water is made from a large tank placed on top of the boilers. The water circulates under pressure in coils of pipe inside of the tank which are heated by live steam from the boilers.

The exhaust steam from the engines is forced through the steam-pipes running to and feeding the Nason radiators situated in the halls and rooms of each flat, and with a back pressure of four pounds on the engines, will fully heat the buildings. If an extremely cold snap should come on, live steam from the boilers may be used in conjunction with the exhaust, or separately, as may be required. A back pressure valve has been placed on the exhaust pipe, so that while the steam is forced through the steam heating pipes, if the pressure is too heavy, the valve allows the steam to pass out into the air automatically. On the pipe leading from the boiler to the steam heating mains has been placed a Mason reducing valve, which keeps the pressure of steam the same on the buildings, no matter how much it may vary in the boilers.

Every attention has been made to contraction and expansion of the pipes by heat and cold, and to show how carefully the work has been done, when the test was made, a pressure of 60 pounds of steam was thrown on to the whole system without a leak of any kind. It is calculated that the exhaust steam from the engines will heat the whole block in ordinary cold weather.

A feed-water heater has been placed in the boiler room, so that, if necessary, the exhaust steam will heat the water, being pumped into the boiler, but ordinarily this will not be used, as the condensed water returning from the steam heating pipes will be pumped again into the boiler.

Every return pipe to the sewer is carefully trapped and no steam can escape there, or sewer gasses return to the buildings. Each parlor has a neat two-light combination fixture, and every other room a one-light fixture. They are neat polished brass fixtures, and furnished with a handsome shade. Every fixture has an approved insulating joint.

Each kitchen has an electric annunciator, which answers to a call from the letter-box or front door, dumb waiter in the basement, and the private hallway of the tenant.

An electric door-opener has been placed upon each front door, so that the door may be opened from the kitchen without having to climb up and down the stairs.

A tramway has been laid running in the basement from Fifty-second street to Fifty-third street with a branch extending to the coal bins and in front of the boilers. The car on this road will be run entirely by electricity and will be used to run in the coal for the buildings and boilers and bring out the refuse and ashes. An electrical alarm has been placed to give the alarm when the tanks are full enough or are getting too empty, thus notifying the engineer.

The best proof of the success of this venture of Mr. Striker is the fact that nearly every store and flat on the whole block has been rented, and by a class of tenants who will remain. Mr. Cole certainly deserves great credit in this work, for it is not only a pioneer plant of its kind, but a model one. Mr. Cole has his office at 775 Tenth avenue, in the same building, and will be glad to show callers who desire to inspect the plant, personal attention.

Besides lighting this new block, the same plant furnishes light for the three five-story buildings on 52d street, known as the Alexander, also owned by Mr. Striker. Altogether wiring has been done for 1,800 lights.

C. W.

Telephonic News

*** The telephone fraternity has lost one of its ablest and most far-seeing members in the retirement of Mr. D. H. Louderback, of Chicago, as announced in our editorial columns. The ranks of telephone pioneers are becoming sadly thinned—but there are some mighty fine fellows left.

The Use of the Telephone in Making Confessions Discussed by Catholic Fathers.

Inventions have been giving some trouble to the holy office. It is admitted that the Pope can bless by telegraph. But the hard-to-be-answered question whether a penitent can confess and be absolved by telephone is not so easy to settle. French bishops have been against it, but, as appeals from their authority have gone to Rome, the holy office must settle the matter. On the live-and-let-live principle, I should, were I a member of that body, be with the bishops, remarks a correspondent. What a monopoly of *Blanchissage de fin* certain preachers and directors of conscience would enjoy were the telephone admitted as a vehicle of communication between them and their penitents! The poor seaside and country abbes, who in summer find variety and some profit in attending to fair and fashionable Parisiennes, must lose this resource if the affirmative judgment be given. Then there is the danger of prying curiosity going beyond the verge of sacrilege.

The use made of the telephone in the Wilson case ought to be a warning. It appears that Italy is even more disturbed than fashionable France on this subject, and that doctors in theological casuistry differ terribly about it. Father Bernardi, of Faenza, says: "Yes, provided the penitent is in a case of extreme necessity." The learned Father Lehmkuhl considers that sins can't be remitted by telephone, but that censures can be given. This is the view of the head of the French seminary at Rome, Dr. Eschbach. The *te* in *ego te absolvo* applies only to a person present. A real presence is, therefore, obligatory in his mind. Telephony, says Father Birardi, lengthens the human ear for miles, and suppresses distance for the voice. Being within earshot is being, for confessional objects, present. Renan thinks the conservatives, unless in extreme cases, are right. Old forms match with ancestral habits, which have become instincts. The church would not appear a church were it turned into a telephonic bureau for the confession and remission of sins, and penitence would become mechanical, as Tetzel tried to make it.

The Nebraska Telephone Co.

The telephone is a very valuable feature of Omaha business and social life, as the system of the Nebraska Telephone Company is not only ubiquitous in the good city itself, and in South Omaha, but connects these with no less than 68 other Nebraska towns. This corporation was organized July 1, 1882, with a paid-up capital of $600,000, and is still busily employed in laying out its lines and bringing its customers into communication. Outside the city it operates about 800 miles of wire. During 1887 there were 11 new offices opened in the State, and in the present year there will be 9. Besides this, connections are made with 61 offices of the Iowa Union Telephone Company, of Iowa. Thus Omaha is directly connected with 117 outside cities. The number of employees in Omaha is 52 and the total number of employees in the State is 184. It is well to remember, however, that as these figures are being constantly increased they can only be regarded as suggestive.

He Thought it was an Electric Wire.

[From the *Rasp.*]

A few weeks ago Mr. James Harley, the boss I work for, procured about 25 feet of copper wire, such as is used by the electric light companies. He told me he bought it over in New York, and it was a sort of a remnant that had passed from the main wire to an arc light and then returned again. It is about the size of ordinary sewer wire, yet, while strong, is a bit more flexible than steel wire.

Last week Paddy Monahan, alias Wiggins, the laborer, and I were sent to a house on Seventh avenue to take out the drain pipe running through the cellar bottom, and replace it with five-inch cast iron.

Paddy was to dig the trench for me and help until the job was finished.

As we started for the job the boss said: "Paddy, take this wire with you, and when you have taken out the drain pipe down to the cellar front wall, run it through all the way down to the sewer. You can tie a good-sized rag on the wire, as you will have a good chance to work it to and fro."

The copper w re was covered with a white casing, or insulating material rather, and only about four feet of it was bare.

"Be jabbers, Misther Harley," said Paddy, "th' divil a bit av me loikes th' luke of those wires, onyhow; I've heerd so much of it killin' people that I'm afeerd till thrifle wid it."

"How is that?" asked the boss in astonishment.

"Sure, don't I heer that th' electhricity from it kills people that tutch it or hes onything till do wid it."

"Oh, you foolish fellow," said the boss; "that's only when the current is going through; take it along with you, because it's a little bit more limber than steel or iron wire, and it can be pushed nearly around a quarter bend.

"All roight, Mister Harley, if you say there's no danger in it I'll use it; but, be jabbers, if onything happens till me I'll lay me deth on yez!"

"All right," said the boss, "I'll insure your life."

We went up to the job, and Paddy began to dig up the cellar and pull out the old drain pipe. We found out that the sewer was stopped up in the sidewalk, and after all of the drain pipe had been taken out, Paddy tied a big bunch of rags around one end of the wire, and began to force it through the sewer pipe.

The pair of us worked the wire, and soon had it away down through the sewer. There was only about six feet remaining out of the pipe, and the end happened to be the one that showed the four feet of the copper.

Paddy every once in a while would tell me about the danger of "th' electhricity that kills min an' horses whin they steps on or handles th' wire."

"Well, we've got her down almast till th' soor," said Paddy, "an' I'm going upstairs till git sum terbacky from me coat."

I followed him upstairs as I wanted to see about the leader connection. We left my Isaac in the cellar tending to the fire.

We staid upstairs not more than ten minutes and then returned to the cellar. Paddy "sput" on his hands and took hold of the wire to work it in and out. All of a sudden he dropped it and yelled out: "Be jabbers, it's full av electhricity; don't go near it for th' luv av Hivin, for it'll desthroy ye!"

I got in the ditch and took hold of the wire, but dropped it like a hot potato.

As soon as Paddy saw me drop it he became more frightened and before I could stop him he flew upstairs, grapped his coat, and ran off.

Isaac attempted to follow, but I grabbed him by the neck and under a threat of giving him a good walloping if he didn't tell the truth, he acknowledged that he heated three or four feet of the wire in the furnace so as to frighten Paddy. He succeeded in doing it, for Paddy swears that he'll bring it up at the "nixt meetin' av the Plumbers' Laborers that Misther Harley, the plumber, has a dangerous sewer full av electhricity an warranted to kill man or baste. An' if he doesn't shtop axin' his min till use it, Crimmins, th' delegate, will giv ordthers to boycott him, be jabbers!"

McElroy's System of Distribution by Condensers.

Among last week's patents the above seems to be one of paramount novelty and we present a description of it to our readers, as it very probably contains the germ of a new departure in the line of transformation of potential by high pressure distribution.

The patentee, W. J. McElroy, of Pittsburgh, Pa., states that "if a condenser be introduced into the circuit of an alternating-current generator, the rapid reversal of direct charges on one set of plates will be attended with an equally rapid reversal of induced charges on the other set, and the

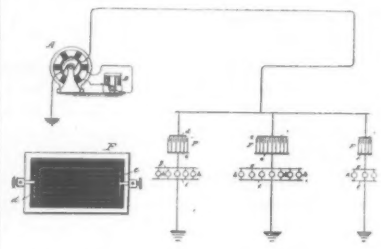


DIAGRAM OF MCELROY'S SYSTEM OF ELECTRICAL DISTRIBUTION.

current in all parts of the circuit will continue as before the introduction of the condenser, notwithstanding the fact that there is no electrical contact between the two sides of the condenser and that no flow of current can take place through it in the ordinary sense of the word. The electro-motive force of the current will be unchanged by the introduction of the condenser or condensers; but the current strength may be materially altered, for, whereas before the introduction of the condenser, the current strength was regulated by Ohm's well-known law, after such changes it will be found to depend on the electro-motive force of the generator and the capacities of the condensers—their joint capacities if connected in multiple, and the reciprocals of their several capacities if arranged in cascade.

"In carrying out my invention I make use of a number of such condensers in connection with an alternating current dynamo-electric generator and a main line, and I vary the construction of the condensers from their typical form by making the two groups of sheets of different size, the smaller sheets being connected to the main line, and consequently receiving a charge of high potential, while the larger sheets are connected to the service or local distributing wires of the system, and furnish them currents of electro-motive force suitably low for the desired work. The electro-motive force available for the consumption circuit is easily regulated or set by the relative sizes of the sheets in the respective sides of the condenser—the larger the difference, the lower the induced electro-motive force—and the number of sheets will depend upon the current strength needed for the particular service wire or circuit supplied. The cause of such change of potential may be readily understood on reference to a few of the phenomena of static electricity. If we charge any body of a given surface to a given potential—say one hundred volts—and then transfer the charge to another similar body of twice the surface, the potential of the charge will be found to have fallen about one-half, or to 50 volts. The quantity of the charge is the same as before, but, having spread over double the area, its surface density is diminished in proportion, and therefore the potential of the charge is reduced by one-half.

"In constructing my improved condensers I make the sheets, as already stated, of different sizes. For example, if it be desired to carry on the main line a current of 1,000 volts, and to supply current on the consumption lines at 100 volts, then the size of the sheets at one side must bear the proper proportion to those at the other side, the smaller sheets being connected to the main line, and charged at each pulsation of the generator to 500 volts on either side of the zero line. From these smaller sheets charged to this high potential, induced charges will be received by the larger sheets, or rather by those portions of them immediately opposite the smaller sheets, these induced charges being probably of the same initial potential as that shown by the small sheets; but at the instant of reversal of the main current, and just as it swings past the zero line, the induced charge, being no longer bound by the electrical attraction of the smaller sheet, is free to flow over a surface larger than that which originally held it, the potential falls accordingly below the original figure, and the electro-motive force at which it can be drawn from this end of the condenser, will be correspondingly reduced below that of the inducing current."

The condensers thus act the part of the present day transformers, and as the forme, could be constructed very cheaply, it seems there may be a wide field for the new system.

Akron Electric Railway.

There are now five electric cars in successful operation in Akron, O., and the sixth will be put into operation shortly. The road is very hilly, with hardly any distance of level roadway. In spite of this and the muddy streets, the cars make from 12 to 13 miles an hour with ease, and give great satisfaction to the entire public. Since the road has been in operation, it has been visited by a large number of street railway delegations from neighboring cities. These visitors have given the system a careful and searching investigation, the management affording them every possible opportunity for so doing.

Some of the visitors expressing a desire recently to see the ability of using the motors for brakes, by reversing them, some experiments were tried with this end in view. One car running at the rate of 12 miles an hour upon a down grade was stopped within a distance of three feet, showing that in case of danger this method of braking is much more effectual than any system of hand brake.

The electric road has been such a great success, that it is said that the management intend extending the road next spring, and have received petitions from residents along the intended route for such action.

Another electric street railway, installed upon the Sprague system, and recently put into operation, is that of Lafayette, Ind. The street railway system of this city is about four miles in extent, and on account of the heavy grades and numerous curves, the test of any motive power is a peculiarly severe one.

There are seven cars equipped with Sprague motors in Lafayette, each car having two motors of 7½ h. p. capacity each. A speed of 15 miles an hour can be obtained if necessary, and in a special test made recently one motor pulled two loaded cars up a 10 per cent. grade without the slightest difficulty. The cars are all beautifully lighted at night with five brilliant 16 candle-power incandescent lamps, which present a brilliant appearance at night.

*** The total number of telephones in use in Nebraska at the present time is 3,518, of which Omaha has 1,261. There is in that city 742 miles of wire. In the first six months of this year the number of messages conveyed to outside points was 66,374, and the number of city calls have amounted to an average of about 15,400 per day. There are nine public telephone stations in the city, and the revenue derived from them is considerable. The toll lines of the company have been extended as far west as York and Columbus, and south to Fairbury.

The offices of this company in the Ramge Block are very elegantly fitted up, and equal in their conveniences to the best in the country. The switchboard used is the Western Electric multiple. The officers of this enterprising corporation are as follows: S. H. H. Clark, president; J. J. Dickey, vice-president; L. H. Korty, secretary and treasurer; Flemon Drake, general manager; and V. P. Musselman, cashier. The company is spending this year about $35,000 in improvements and extensions, its outlay of last year in the same direction being $30,000.

SOUTHERN ELECTRICAL NOTES.

(Special Correspondence.)

At Gadsden, Alabama, the line of wire has been completed on the Richmond and Danville Railroad, and telegraph instruments are in place and everything ready for business.

It is definitely understood that the legislature, ensuing, will be requested to grant to Tuscumbia, Ala., the power to issue bonds for electric lights.

Mr. Gardner, of the Gamewell Fire Alarm Telegraph Company, left Charleston a few nights ago, having concluded his contract with the city government for police alarm boxes. The first tests were made on Thursday night, November 1st, by Mr. Lilienthal, of the committee appointed by the City Council to inspect the work. Chief Golden made the circuit of the remaining boxes, and transmitted the signals to Mr. Lilienthal at the central station. The whole test was satisfactory. Chief Golden has purchased two horses for the system and they are now only awaiting the finishing of the harness, the contract for which has been given.

At Savannah, the superintendent of the fire alarm service, Mr. John Jay, while detaching the wires in a pole 25 feet from the ground, was hurled to the earth by the pole breaking off at the base. He fell beneath it. Two bones in the left foot were broken. He was picked up unconscious, and it is feared that he has sustained serious injuries.

The Thomson-Houston Electric Light Company will, at the Augusta Exposition, make one of the finest exhibits ever arrayed in the south. They will show four arc dynamos and an incandescent dynamo, besides all the latest appliances in illuminating. They have 140 arc lights in the building, and over 300 incandescent lights, besides some 20 stands of lights in the grounds.

At Columbia, S. C., steam was turned on at the building of the Congaree Gas and Electric Company, November 1st, and the machinery given a thorough test. The result was eminent satisfaction. The building is a model of its kind, and the roof is covered with the new patent iron roofing. The plant comprises a boiler of 125 horse-power, and a Taylor engine of 100 horse-power. The engine runs two dynamos, each of 30 arc light capacity, and upon the magnet and armature of each is coiled nearly 12 miles of fine copper wire. The fly-wheels of the engine—two in number—are each five and one-half feet in diameter, and a broad belt connects each with drums on the dynamos, 18 inches in diameter. The arc lights for street lighting are of 1,500 candle-power, and besides the 14 contracted for by the city, there will be six inside and two outside the Union Depot, and others have been engaged by private parties.

Mr. W. T. Gentry, manager of the Atlanta Telephone Exchange, is one of the most universally popular gentlemen in the South. A brief sketch of him will doubtless be of interest to all the fraternity. He was born in Gordonsville, Va., April 14th, 1854, and is 34 years old. He left school at the age of 17 years, and engaged in the telegraph business, in which he became an expert. He began with the Southern and Atlantic Telegraph Company as an operator, and when 20 years old, had charge of the Virginia division of that company. The Southern and Atlantic Telegraph Company was consolidated with the Western Union, and Mr. Gentry began at the foot again, but soon worked up to the management of the Western Union Telegraph Company at Alexandria, Va. In 1884, he was offered the position of manager of the Atlanta Telephone exchange, which he accepted April 1st, 1884. The exchange had, at that time, about 365 subscribers, and now numbers about 1,000, and is growing every month. Mr. Gentry is strict in his business habits, and requires implicit obedience from his employés, but he is more loved by his subordinates than any man in Atlanta. He has a kind word for all he meets, in business or socially, hence his popularity with all his acquaintances.

The Birmingham, Ala., Gas and Electric Light Company have decided to issue the second mortgage of $200,000.

At Montgomery, Ala., the Brush Electric Light and Power Company are adding machinery for incandescent lighting.

At Lexington, Ky., the electric light company is being considerably enlarged.

The Nashville, Tenn., Light and Power Company will increase the capacity of their plant by adding a 150 horse-power compound engine and two 75 horse-power boilers, a 650 light Westinghouse incandescent machine and two brush arc machines. Improvements to cost $30,000.

At Granite Falls, N. C., the Electric Light Company have put in Brush electric lights, 1,000 more spindles, 18 cards, two twisters, one picker in their factory.

The San Antonia Electric Light Company, of San Antonia, Texas, has been chartered with a capital of $50,000.

EDWARD. A. OLDHAM.

Charleston, S. C., Nov. 6, 1888.

A Yellow Fever Heroine.

A JACKSONVILLE TELEPHONE OPERATOR WHO REMAINED AT HER POST THROUGH ALL THE TERRIBLE SCENES IN THAT CITY.

It will be difficult to write the history of the great yellow fever scourge in Jacksonville, Fla., this year, and do justice to the many heroes and heroines it developed. The letter we publish below will give our readers an idea of the bravery of one young lady of 16, who remained at her post during those sad days, her only company being calls for doctors, undertakers and ambulances. Her name is Miss Mamie Davis, and she was fortunate enough to escape the fever, although all others connected with the office were taken sick, but recovered.

We are glad to know that the Southern Bell Telephone Company appreciates the work of this little heroine, and intends to see that a proper testimonial is sent her.

The following letter was written by Mrs. W. B. Owen, the young lady manager of the Jacksonville telephone office, to Mr. John D. Easterlin, the district superintendent, and will, we think, give an idea of the pathetic situation there at the time—a situation that we in the north can never fully realize. The letter was forwarded to Mr. D. I. Carson, of New York, from whom we received it:

JACKSONVILLE, FLA., Oct. 17th, '88.

JOHN D. EASTERLIN, Esq.,
Charleston, S. C.

Dear Sir: I intended writing you from the office to-day, but was kept too busy, so will write you a few lines this evening.

Mamie Davis has been sick to-day and has not been to the office, so I had to do operating and a little of everything. I do not think Mamie has any symptoms of the fever, but it is dangerous to get sick now. She had a very hard cold yesterday and complained of feeling tired. I told her to go home and I would do the operating, but she refused. Her brother said this morning that she had no fever, and would be back to-morrow.

There is no doubt that if it had not been for her the Exchange would have been closed. At one time we were all down (including Manning, the lineman), and for one day she ran everything by herself, the next day Finegan came back. For some time she had been alone with Manning, working from six in the morning till night, and eating her dinner at the board. She does not take any special credit to herself, but says it was very sad and lonely, the only company being the calls, and most of them for doctors, undertakers and ambulances, and she was constantly expecting to hear that some one of us were dead. She and her little brother, a messenger boy for the telegraph company, support her mother and themselves. Her mother did plain sewing and rented rooms before the fever broke out, but since has not been able to earn anything. I sincerely hope that she is not going to have the fever. She has grown to be a very good operator, and will be valuable to the company this winter. Theresa O'Rourke is a very good operator, too, and they both are very steady and reliable.

We engaged Alice Jeackle as learner, beginning yesterday. She seems to take great interest in it and I think will learn fast.

Mr. Dillon still has very bad days, and in fact we all find it hard to get entirely well. We compare notes on our feelings, and find comfort when some one else feels a little worse than we do.

* * * * * *

We need not assure you that we will be very glad to see you when it is possible for you to come. They do not give us much encouragement though to hope to see our absent friends very soon. They will not be allowed to return much before January, as it will take some time to thoroughly fumigate and destroy infected articles.

Telegraphing to Trains.

With reference to the recent sad accident in France, *Electricité* for last week laments the absence on railways of the means of countermanding by use of electricity the signals given to allow trains to pass, if, as happens in some cases, a signal has been wrongly given or a mistake is afterwards discovered, so that an otherwise unavoidable frightful accident may be averted. The case was put very strongly in a communication to the Kingston papers at the time of the Hampton Wick disaster: "One of the saddest points about the whole accident is the personal attitude of the signalman in such cases. For years and years he has gone on with his duty faithfully and conscientiously, making no mistake, till one day, under pressure of extra work, he makes a slip; he discovers it, may be, as in this case, immediately, and the position of the signalman may be better imagined than described. He has set the points wrong, sent the train on its deadly journey, and in a moment realizes the whole horror of the situation. What is he to do? There is no means of communicating to the engine after it has passed the signal, or of stopping the oncoming train. He has made a mistake, and what is more, has no power, even if he finds it out before the accident, to prevent it happening. Very few of us are under such conditions in life, that by a single slip in our ordinary business we may launch numbers of our fellow men into eternity, without the possibility of retracting our error if immediately found out. Imagine for a moment what the state of mind would be of an ordinary clerk or secretary, if every letter he wrote carried with it the certainty that a mistake in address might by some means hurl hundreds of men to destruction, and that there was an absolute veto on the part of the post office for any alteration of such mistake, and no possibility of telegraphing to the person the letter was addressed to. A signalman *is* in such a position, and may be tried for manslaughter for such a slip in his business practice. One of the most terrible and sensational railway accidents that ever happened occured under similar conditions in these respects to those of the present accident, but with far more disastrous results. Who does not remember reading with horror the description of the accident at Monte Carlo? The train being despatched on the single line by some oversight of the station-master, while the train due shortly in the station was being despatched on the same line in the opposite direction. The station-master realized his error, but there were no signals to alter between the two trains. He rushed hither and thither, rung, for a futile resource, all the bells in the station, and yelled in his despair to make the engine-driver perceive his danger—but with no avail. And the whole number of officials and passengers on that station stood with awful dread watching the two distant white puffs of smoke getting nearer and nearer round the curve on the rocky shore, until they shaded their eyes with anguish when the two trains met and went over the precipice in blinding steam. May not the public ask: Is there no resource of science which will prevent such irremediable mistakes happening in the future? Accidents will happen; but when there is, as there sometimes is, considerable time after the discovery of the error, are there no means to stop the train at any part of its course?" The writer goes on to point out the security which might be obtained from this class of accidents by the adoption of some system of induction telegraphing to trains in motion as in use in America, or of telephoning by means of a Ruhmkorff coil in the guard's van as experimentally tried in France. It is obviously the duty of railway or other companies whose dividends are earned by taking charge of human life to be fully abreast in practice of the latest development of scientific research for the safe-guarding of life, and the remarks of *Electricité* on the recent accident in France add point to this by demanding that some better means ought to be provided for remedying possible errors than by the futile ringing of the station bell, or the insane knocking of the station-master's head against the wall in anguish over a fatal and irremediable mistake.

TELEGRAPHIC

.... The telegraph poles of the German Empire are largely, if not exclusively, obtained from the forests of Prince Bismarck's estate, at Friedrichsruh. The departure of the 100,000th pole has been recently celebrated there with great festivities.

.... The Western Union Telegraph Company again proved its wonderful resources, and sent out election bulletins the night of November 6th that gave a most comprehensive and accurate idea of the political situation. The returns were sent out with remarkable promptness, and early in the evening, the unprejudiced man who noted these returns was able to conclude as to how the election would result. We doubt if the public realize what the work of handling the election returns amounts to, or the valuable and thoroughly comprehensive system this company has perfected.

.... It is said that the increase in the company's business at Charleston, S. C., in the past two or three years has been very great and altogether out of proportion to the enlargement of the facilities for handling it. In the month of September alone, 12,000 more messages were handled at the Charleston office this year than for the same month last year. With the prospect of a still greater increase as business keeps on it is impossible for the business to be handled properly unless the service is increased, notwithstanding the fact that the company got two wires some time ago from the Southern Telegraph Company. The company, however, are now putting up two copper wires, which will no doubt do much to relieve the situation. One of these wires will run from New York to Atlanta and the other to Augusta. This will enable the company to devote one wire exclusively to the commercial news department. Only ticker stations will be allowed on this circuit and hence all other business will be greatly facilitated.

The T. M. B. Ass'n.

The annual meeting of the Telegrapher's Mutual Benefit Association will be held in the Western Union Building, 195 Broadway, at 4 o'clock, on Wednesday, November 21st, 1888.

He Slept Peacefully Until the Electricity Stopped Running.

A young man sat at a telegraph instrument sending a message to Boston. It went on beautifully for a while, and the Boston man had no trouble to get it all.

Then it slackened a little, and finally it became somewhat spasmodic, and seemed to have passed into a cipher despatch.

For a moment or two the Boston operator sat listening to the quotations from the alphabet which the young man in New York was ticking to him, and then his patience gave out.

He sent a red-hot message to the young man in New York, and wanted to know what in several exclamation points he meant by all this stuff. No response. Only a feeble little instalment of the alphabet, without rhyme or reason.

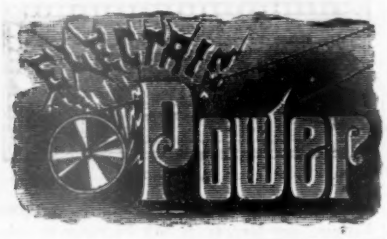
The Boston man stopped the current.

This seemed to have had an effect on the young man in New York, for a moment after, this message ticked merrily on the Boston man's ear:

"Don't mind anything sent for the last few minutes. I have been asleep."

The New York operator, who had sat up late with a well friend the night before, had gone to sleep at the instrument, and mechanically worked the button. When the current was broken, it woke him up.—*N. Y. Evening World.*

New York City.—The Gardiner Auxiliary Fire Alarm Company, of New York. Capital stock $3,000. Loren N. Downs and others incorporators.



After the recent National Electric Light Convention, if we remember aright, the electrical journals did not take a month to publish the Proceedings. In more ways than one, the electricians are showing the way to other light furnishers.—*Phila. Light, Heat and Power.*

The Daft Electric Company, of San Francisco, has brought suit against C. H. Howland and other individual members of the Los Angeles Electric Railway Company, to recover $15,684 claimed to be due on the plant of the road. C. M. Whaling has also brought suit for $856 for work done on the road.

On November 1st, the western offices of the C. & C. Electric Motor Company were moved into the new Edison Station Building, Nos. 139 and 141 Adams street, Chicago. When fitted up, Mr. F. N. Armour, manager, expects to have one of the most prominently located, and best appointed electric motor salesrooms in the country.

The residents in the vicinity of the water tower at St. Louis, Mo., are complaining that electric lights are no longer used on the tower. An appropriation of $900 for the lights was made about a year ago, and their discontinuance is a matter of regret, especially as the darkness is taken advantage of by some people to deposit refuse around the place.

Last week, on the application of General Henry Brinker, Judge Werner granted an injunction restraining the electric railway company from laying tracks on the boulevard in Charlotte, N. Y., and especially from crossing the bridge of the Rome, Watertown & Ogdensburg railroad company. The action was brought in the name of this latter company, and the papers were served by Sheriff Hodgson.

The electric motor cars at Council Bluffs did not run last week. About 10 o'clock in the morning a northwestern pile driver, while crossing the motor line at Broadway, got caught in the wires of the motor line, and the damage that resulted will require several days to repair. The wires will probably have to be raised at the northwestern crossing, otherwise every time a pile driver comes along there will be trouble.

The Seattle, W. T., Electric Railway Power Company has made a number of contracts for its plant. A contract has been entered into with the Thomson-Houston Company, of Boston, for the entire electrical equipment for the road, $35,000 being the consideration. Another contract has been signed between the company and J. W. Jones & Son, of Troy, N. Y., for car bodies, $4,000. Also with the Jarvis Engineering Company, of Boston, for an engine and boiler to run the dynamo, $6,000. This includes the setting of the boiler and engines.

The question of electric lighting in Medford, Mass., came up before the board of selectmen again last week. W. P. Martin said that the Medford company could do nothing without having another meeting, and the selectmen do not propose to wait any longer, and as the Malden company had signified its readiness to present a contract and carry it out at once, the board went into executive session to consider the terms. By a unanimous vote a contract was closed with the Malden Electric Light Company for 200 incandescent lights and 20 arc lights, the latter and 40 of the incandescent lights to be furnished immediately, and the balance of the 200 incandescent lights to be furnished before spring. All the other lighting in town is to be by oil lamps furnished by the same company, and the whole system of lighting to be furnished at the rate of $7,000 per year for a term of three years.

An Automatic Self-Lighting Lamp.

Every electric light employé readily acknowledges the need that exists for a convenient lamp for explorations in all sorts of dark, hidden places. A lamp for such uses is represented here, natural sizes, both closed and lighted. It can be carried in the vest

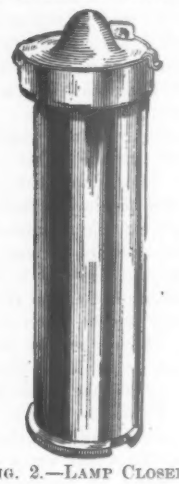


FIG. 2.—LAMP CLOSED.

pocket, can never spill or leak, is lighted without matches, always ready, and gives light enough to examine a line or a meter, or renew a safety strip, or show the route through a dark cellar or garret.

All that is necessary to produce a light, having first opened it, is to give the bottom of the lamp one complete revolution, when

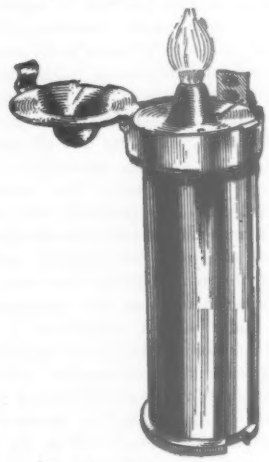


FIG. 1.—LAMP OPEN.

an automatic tape match lights the flame. A couple of hundred such matches accompany the lamp, and a thousand more cost but 15 cents. Messrs. Wunder & Co., 42 Lasalle street, Chicago, are sole agents for this handy little lamp.

—— Wilkesbarre, Pa., will have electric lights and an electric street railroad in the near future.

—— The Paducah, Ky., Gas Light Co. are making preparations for their electric light plant.

—— The Georgia Electric Light Co. of Atlanta will enlarge their plant by an addition of two 50 arc light dynamos.

—— The American Illuminating, of Jacksonville, Fla., is enlarging its plant by the addition of new engines and boilers.

—— The Light, Heat and Power Company, of Pottstown, Pa., is contemplating the erection of a large brick building.

—— The Northampton, Mass., Electric Light Company is engaged in stringing wires for long-distance system of lighting.

—— Edward W. Tisdall, special agent of the Brush Electric Company, has recently sold a 65-light Brush arc light machine to be used for central station purposes in Philadelphia.

—— The Pueblo (Colo.) Light, Heat and Power Company expects to be in operation about December 1st with a 1,000 light Westinghouse plant. The officers of the company are J. D. Miller, president; J. H. Bennett, vice president and treasurer; J. O. Albert, secretary; H. A. Fitch, manager.

Proper Tests for Non-Magnetic Watches.

BY MR. H. E. DUNCAN.

People operating or working around dynamos are often called upon to make or assist in some test intended to demonstrate the practicability, or otherwise, of non-magnetic watches, and, in so many instances, I have found people who think the only test to make is, if possible, to find some place on their dynamo, usually some corner near the armature, where the lines of force are concentrated sufficiently to retard the motion of the balance, and, in a few cases, stop the watch while in contact with the dynamo.

There is, unluckily, about the country a very few old pattern dynamos that are rich in such points, and, while they are quite successful in stopping watches, it is not to the credit of the efficiency of the dynamo.

A non-magnetic watch presents to the manufacturer the following problems for solution. Such parts of the movements as will become polarized, owing to the metal of which they are made, when brought into a magnetic field, and thus render the watch useless as a timekeeper, must be replaced by metals non-magnetic that will give equally as good results in timekeeping, as well as in the problems of manufacture or durability; and that tests of these qualities may be made by anyone, and of a nature calculated to show only correct conclusions, is the object of this paper.

The parts of a watch most vital to its timekeeping are known as the balance hair spring, and the escapement, and these parts are the most expensive to manufacture, as well as being those upon which the skilled adjustor shows his skill as a workman.

When a watch with these parts of the ordinary construction is placed within a magnetic field, the pieces feel the magnetism in the order named, and so retain it after removal from the magnetic field. And in the watch of ordinary construction, these parts are made mostly of steel, which is very sensitive to magnetic influences, and retains it longer than any other metal; consequently, it is the worst possible metal to use for such parts in this electric age.

Few persons outside of those engaged in watch manufacture, can realize the obstacles to be overcome in making these parts named of non-magnetic alloys that had all the properties of steel in expansive ratio, elasticity, as well as to weld, turn, and polish—in fact, a book could be written, entitled "Recent Problems of American Watch Making," that would be very interesting reading, especially to such watch manufactures as have not passed the experimental age.

And it is no idle boast when I say that an alloy hair spring is now made by the Waltham Watch Company that is better than steel for a watch hair spring, and the elasticity is not a property of hammering, rolling, or drawing, but of the alloy, and that the spring can be heated to a red heat and in no way anneal or change the elasticity, as it would were it a property of artificial hardening, and the spring daily shows better results than the older and more uncertain fire-hardened steel hair spring.

To test a watch for any purpose, it is necessary to know how it runs, or, to be more exact, what its daily variation is by some standard clock, and this is known as the daily rate, and the watch to remain in the same position throughout the trials, that the conditions may be the same, as no watch but has an error, so-called, due to change of position, this error being the smallest in the highest priced watches.

And for the benefit of those who think otherwise, let me say no watch ever keeps perfect time, nor can such a watch be made. After having found what its variation is for the twenty-four hours, then expose the watch to some strong magnet or dynamo, at the distance it would be when in the pocket, and for about the length of time a person would be in the field of the dynamo, if in attendance, and, having noted the time by comparison with the standard, again note the time after the exposure to the dynamo, and note the error, if there is any.

This test (the most cruel) will have but one value, and that will be in deciding whether it is possible to carry a watch round that dynamo and be sure of accurate time, unless you avoid some point where the lines of force are concentrated. In some such cases presented to my personal attention, I have found the magnetic force outside the dynamo to stop the watch, due to the steel seconds hand being held by the magnet, and by replacing the hand by one of gold, the watch was not in the least affected by the dynamo. I have yet to find a case where a Waltham non-magnetic watch could not be carried by a dynamo attendant *in his pocket* round the dynamo when in attendance, without disturbing its running or its timekeeping qualities, but I think a magnet could be made that will stop a watch that was made wholly of copper, and I think I have the support of some of our most eminent electricians in this country in this statement.

And before resuming the last and decisive test, I wish to say a word to such as have so often as a test placed their watch upon a dynamo and left it to run for a period of twelve or fourteen hours, that it is a test that no sane man would deem fair, as it usually ruins the balance pivots by so doing, as the balance arbor or shaft is a small piece of steel about one eighth of an inch long and about the size of a cambric needle, the ends or pivots turned down to about four one thousandths of an inch and running in jewels, and when the watch runs for a few hours in an intense field, these little pivots are drawn to one side of the jewel, with force sufficient to wear, and often bend them, and thereby making the watch run badly till the proper repairs are made, or a new arbor put in.

We now come to the final test of the watch which can be readily decided. The rate or daily variation of the watch being known from the first trial, and it having been exposed to a magnet that would have rendered an ordinary watch useless instantly, it only remains to repeat the first trial under the same conditions of position, temperature and duration of time of trial, comparing the difference with the first rate of the watch obtained, and the difference, if any, will be due to the magnetism remaining in the watch.

Dynamo attendants form but a very small part of the watch carrying public that require a watch that will not be rendered worthless by magnetism, but are liable to come within the field of some magnet for a short time and not know it till their watch shows some freaks as unexpected as they are undesirable. Yet such dynamo attendants are the persons that usually make the test of the non-magnetic watch for themselves and friends, and if this little sketch of a proper test aids them in so doing, its aim will be accomplished.

Manufacturing Notes.

The Edison Company will be conspicuous at the coming International Exposition in Paris. Other electrical companies of this country should also be well represented.

The Hauss Electric Company has opened offices at Nos. 63 and 65 Murray street, New York. Mr. J. S. Zerbe, formerly of Cincinnati, is the secretary of the company.

Chas. A. Schieren & Co. report sales of their electric perforated belting to 12 different electric light companies during the past month. The demand for this article is steadily increasing, and so far the manufacturers feel that their claim that it is the best belt made for dynamos is well sustained.

The Schenck Belt-holder and Shifter Company have already secured, as selling agents, some of the largest and best known machinery houses, and the outlook for future business seems good. The fact of this machine being an excellent substitute for older and more expensive methods of controlling belts, recommends it to the practical mechanic at once. The management states that electric light plants, where large and heavy belts are used, are rapidly adopting their device although the work in many cases is very difficult.

Another Electric Light Purchase by Mr. Geo. Westinghouse, Jr.

Mr. George Westinghouse, Jr., has purchased the entire capital stock of the Waterhouse Electric and Manufacturing Company, of Hartford, Conn. The machinery for the manufacture of the arc apparatus of this company is being erected in the works of the Westinghouse Electric Company, at Pittsburgh, and preparations are being made for the manufacture of arc apparatus on an extensive scale.

When the Westinghouse Electric Company began its operations it had in view confining itself to the alternating incandescent apparatus, and to that end it entered into a contract with the Thomson-Houston Electric Company, of Boston, whereby that company recognized the alternating current patents of the Westinghouse Company and agreed to sell to the Westinghouse Company its arc light apparatus. The contract existing with the Thomson-Houston Company will, says the Pittsburgh *Chronicle-Telegraph*, by reason of a notice duly served by the Westinghouse Company, terminate the 30th of November, and the Westinghouse Company has therefore determined to exploit the arc lighting business to the greatest possible extent; and to that end has not only secured the Waterhouse inventions, but other valuable inventions relating to the automatic regulation of the current for arc lighting purposes, improving the apparatus and greatly cheapening the cost of construction.

The Waterhouse Company has about 5,000 arc lights in operation and a number of important stations.

The experiments that have been conducted by the Westinghouse Electric Company during the last three months with the Tesla motors have been of a most satisfactory character. A form has been perfected that will operate the existing alternating circuits for the running of fans and other light machinery, and also the large motors for street car purposes and power purposes generally have been brought to a high degree of perfection and efficiency.

In street car work the Tesla motor has great points of value, having no brushes or commutators, and its promotors claim can be constructed so that even if covered with mud and water no possible danger can occur.

The manufacture of the Shallenberger meter for measuring the supply of light is being pushed. Already 100 meters per week are being turned out, and the required machinery for 300 per week is being obtained, while the demand for the meters is greatly in excess of the present supply. These meters will measure the currents for the motors and for lighting, and will give to all users of light the advantage of the electric light and motor for power purposes at rates in competition with gas for light and at low rates for the motor service.

Already the Westinghouse Electric Company has contracted for the supplying of plants to 122 stations, 38 of which have ordered machinery, increasing their plants since starting. Some of the stations have made successfully four increases.

During the month of October, the apparatus contracted for amounted to 48,000 lights, 25,000 of which are for use abroad. The increase in business has obliged some of the departments of the company to be run until 10 o'clock at night.

Mr. Westinghouse, who personally effected the purchase of the Waterhouse system, is turning his great energies and means very largely towards the development of electricity in all its branches. He is to be congratulated over this recent move, as he now secures an excellent arc system, and is now fully equipped to supply arc and incandescent light, and small and large electric motor apparatus, and also to measure and record the quality of current delivered to any customer.

—— The interior of the electric power house in Glenwood, Cal., is receiving the finishing coat of paint. The dynamos are being placed in position ready for use, the wire connections are completed, and but a few more days will elapse until the electric light will be supplied by the new plant.

NEW ENGLAND NOTES.

Middleboro, Mass., seems likely to be favored by an electric street railway.

The Acushnet Mills, New Bedford, are now electrically lighted.

The Newport, R. I., News publishes a long account of the new Edison station in that city, which is complete in all particulars.

The Mather Co., N. E. agency, are now installing a 600 light plant in Fall River, for the Border Manufacturing Company.

It now seems probable that the electric system over the highlands, Lynn, will be in operation within a week. The long delay has been caused by the proper machines not arriving at the Pleasant street station of the Lynn Gas and Electric Light Company, from whence the cars are to get their power. The railroad was connected with the station Thursday afternoon, at the corner of Market and Oxford streets.

Messrs. Archie Perkins and H. G. Balkam, the latter being the manager and superintendent of the Edison Electric Light Company's Brockton station, have formed a partnership as the Brockton Wiring Company, to do electric wiring work. We wish them success.

A new 125 horse-power engine will soon be added to the electric light plants, at Laconia, N. H., as motive power, the water wheels now in use not being adequate for that purpose.

The Russell Electrical Manufacturing Co., of Providence, have an excellent device in their arc light mast arm. The arm itself is a permanent fixture and the suspending lamp is drawn in for examination etc. to the pole or whatever it may be fastened to, by means of pulleys encased in a hollow cylinder, as illustrated in cut. The duplex electric cable which supplies the lamp with currents is also *inside the cylinder*, and is used as an operating cord as well as a conductor of electricity, and is a part of the arm. The cable connections are made at the factory ready to connect the lamps at one end, and the main lines at the other, thus saving the consumer the expense and trouble of attaching wires, etc.

The Providence and Worcester railroad will light the Providence freight yard with electric lights to facilitate night switching.

The Simplex Electrical Co., of Boston, has bought the stock in hand of the Campbell Electrical Supply Co., of that city, and will hereafter control the sale of the entire product of their factory. It is proposed to maintain the reputation which the Simplex Electrical Co. has acquired of handling high grades of goods, by making at this factory an insulation much superior to that heretofore turned out there. The stock of Vulcan wire on hand will be closed out by the Simplex Co. at reduced prices.

Salem authorities have contracted for 25 additional electric lights, five to be placed on the Marblehead road.

The Webster Electric Company is putting in 250 lights at the shoe factory of A. J. Bates & Co.

Work has been begun in Stoughton, Mass., for a new light station to be constructed by the Stoughton Light, Heat and Power Co. It is expected lights will be furnished by Christmas.

Brockton, Mass., is very much pleased with its electric road which has been running regularly on the Crescent Street branch.

The Newton Electric Light and Power Company has sold out its entire plant, consisting of machinery, engines and buildings on Crafts street, Newton, to the Newton & Watertown Gaslight Company. The sale was owing to the failure of the electric light company to obtain a contract from the city of Newton to do the entire street lighting of the city. The gas company, after the electric light company had submitted its bid, offered to take the contract to do the entire street lighting for a less sum. The Board of Aldermen had previously voted to award the contract to the electric light company, but the common council non-concurred and the final awarding of the contract was postponed until it could be ascertained whether the gas company would be given the right by the gas commissioners to establish an electric light plant in the city. The gas company applied for the right to the gas commissioners, and several hearings have been held before that body, but the question has not yet been decided. It is regretted by many citizens that the electric light company concluded to sell its plant, as the gas company will now have a clean field, and the prices to the consumer may be raised, as there will be no competition.

West Newbury, Mass., is congratulating itself on the prospect of an electric road to Newburyport in the spring, and the local paper grows quite enthusiastic in prophesying the benefits that will accrue.

Springfield's (Mass.,) accumulator system is retarded in its extension by a scarcity of lamps. Orders cannot be filled.

Something seems to be the matter with Winchester's, Mass., lighting plant. The citizens complain that their illumination is unreliable and that if the matter is not remedied a return to gas will be the result.

From the Lynn, "*Item.*"—"Curiosity to observe the practical workings of the electric system as applied to street railways is on the alert to witness the first trip over the Lynn rails. The overhead wires are in place, but the cars do not come sailing around the curve as it was hoped they would before election. Doubtless the officials are as desirous to start as the people are to have them, and at the earliest possible moment we shall hear the troll of the trolley as it hums along the wires."

Mr. A. E. Davidson, formerly of Lynn, now in charge of the Thomson-Houston light plant at Bozeman, has written home a letter describing his plant and remarking the wonderful increase in popularity of electric illumination in that section. An electric street railroad is contemplated by the citizens of this bustling little city away out among the wild and woolly Rockies.

George H. Almon, of Montpelier, Vt., is superintending the installation of a 5,000 light incandescent plant in Buffalo, N. Y.

Workmen are busily engaged in laying the foundation for 30x30 feet extension to the Marlboro Electric Light Station, which is to be built as soon as possible. The boiler room is to be doubled in size, and a new and large boiler will take the place of the one now in use. Another engine from the manufactory of Armington & Sims, Providence, has been ordered. Two more dynamos, capable of increasing the facilities of the company to five hundred incandescent lights, will arrive and be placed in working position as soon as the changes about the building are sufficiently advanced to receive them.

Snow, Bassett & Co., Franklin, Mass., are arranging to have their factory lighted with electric lights, about 200 being required.

E. C. Russell, manager for the Westinghouse Electric Light Company, began, this morning, the work of putting in the company's incandescent lights for Norridgewock, Me. The current is to be brought from Skowhegan.

The special committee of the Lowell city government has reported an ordinance granting the right to Warren Aldrich to erect poles, string wires or lay them in conduits.

Mr. H. D. Stanley, of the Bridgeport Brass Company, was in Boston Friday and Saturday, and, it is almost needless to add, was very busily engaged with numerous customers here.

The Gould-Tisdale Revolving Semaphore Company, manufacturers of electric semaphores of a new design for railway signaling, has opened offices at 9 and 11 Pearl street, Boston, where the apparatus is shown in working order.

The National Telephone Manufacturing Company is now installed in its new offices in the Hathaway Building, 620 Atlantic Avenue, Boston. Mr. Woodward Emery is president, Mr. S. K. Roberts, treasurer, and Mr. J. B. Bennett, superintendent. The company is doing a large business in private line telephone apparatus (non-electric) and in magneto and electric signal bells.

T. W. S.

ELECTRIC LIGHT NEWS

—— Waxahachie, Texas, has just closed a contract for an electric light plant.

—— The Read house block and hotel at Chattanooga are lighted by the Mather system throughout.

—— The cotton mill at Dallas is to have a 500 light plant, as is also the new Asylum, at Terrell, Texas.

—— Gainesville, Texas, is to have a new Westinghouse alternating plant. The construction is now going on.

—— The new Westinghouse alternating plant, at Ft. Worth, Texas, was successfully started about October 20th.

—— Cohoes, N. Y., is to be illuminated by electric lights. The Cohoes Electric Company is to erect 100 lamps at $12,000 per annum.

—— The Queen City Electric Light Company, of Dallas, Texas, has been awarded the contract for lighting the city. They begin with 75 arc lights.

—— The electric light plant at Walla Walla, W. T., is completed and works well. It was supplied by the Electric Power and Supply Co. of Seattle.

—— At a special town meeting in Hyde Park, Mass., Oct. 23, it was voted to transfer the contract for street lighting to the Hyde Park Electric Light Company.

—— The Englewood Electric Light Company have bought a Westinghouse alternating plant of 750 16 c. p. capacity which is running nicely and giving satisfaction both to consumers and the company.

—— At Turner's Falls, Mass., the electric light company has just added three street lights to its lines. The water-power company has begun the foundations for the new building, and when it is finished the works will be enlarged.

—— The Calumet and Hecla mines, in northern Michigan, which have been using Brush electric lighting apparatus for some years, have just arranged to increase their electrical plant by ordering, through Alexander Kempt, special agent for the Brush Electric Company, a new 28 to 30 light dynamo, and some additional lamps.

—— The Mather Electric Company, of Manchester, Conn., has recently put in a 30 horse-power Mather motor in the grain elevator of W. H. Childs at Manchester. The motor is used for running the "new process" rolling mill that Mr. Childs has lately put in, and is wound for a 220 volt current, and is said to be the largest single motor operating in New England.

—— The illumination of Weyers Cave, Virginia, by incandescent lights has proved a great success. About half the capacity of a 650 light Westinghouse alternating current dynamo is required. A large hotel is being built at the mouth of the cave which will use the surplus light. The plant is run by water power and was installed by the Marr Construction, of Pittsburgh, Pa.

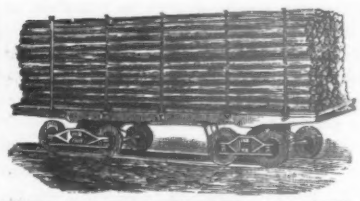
—— The electrical search lights with which every modern man of war is now provided, are in themselves articles of peculiar interest. They are of the arc pattern, ranging from 8,000 to 30,000 candle-power, so arranged with reflectors that their rays can be concentrated into a single beam and thrown in any direction. An object two miles distant is easily illuminated.

—— The Cohoes, N. Y., Electric Light Company, to whom has been awarded the contract for furnishing the city with 100 electric lamps, will soon establish a new plant in the neighborhood of the Cataract House, as the present plant will be inadequate. The new building will be built of brick and iron, and two new dynamos will be placed in the structure. It is understood that the new plant will be similar to that in Troy.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING NOVEMBER 6, 1888.

392,213 Transformation and distribution of electric energy; William J. McElroy, Pittsburg, Pa.
392,228 Mast arms for electric lights; Charles W. Russell, Providence, R. I., assignor of one-half to John I. Drake, same place.
392,230 Electric regulating and hand setting mechanism for clocks; William S. Scales, Somerville, Mass., assignor to the Synchronous Time Company, Portland, Me.
392,244 Secondary battery; Hugo Walter, Cincinnati, Ohio, assignor to James R. Murdock, same place.
392,248 Police alarm system; John C. Wilson, Boston, Mass., assignor to the Municipal Signal Company, Portsmouth, N. H.
392,301 Telephonic circuit; Robert M. Bailey, Williamsport, Pa., assignor to the American Bell Telephone Company, Boston, Mass.
392,326 Telephone switch board; Claude C. Gould, Batavia, assignor to the Eastern Electrical Mfg. Co., Wheatfield, N. Y.
392,370 Regulator for alternating current generators; Robert P. Sellon and William M. Mordey, Victoria Works, Belvedere Road, County of Surrey, England, assignors of one-third to Charles E. Webber, same place.
392,385 Electroplated coil for electrical measuring instruments. 392,386 392,387 Electrical measuring apparatus; Edward Weston, Newark, N J., assignor to the Weston Electrical Instrument Company, same place.
392,393 Arc lamp; John C. Young, Newark, N.J.
392,400 Electric discharge device; Reginald Belfield, Pittsburg, Pa., assignor to the Westinghouse Electric Company, same place.
392,403 Switchboard for telephone exchanges; Francis Blake, Weston, Mass.
392,437 392,439 Electric meter. 392,438 Combined electric meter and clock system; Philip Lange, Pittsburg, Pa., assignor to the Westinghouse Electric Company, same place.
392,440 Electric gas lighter; Joseph H. Lehman, Philadelphia, Pa.
392,443 Magneto signaling apparatus. 392,444 Railway signal; Malcolm W. Long, Harrisburg, Pa.
392,470 Operating alternate current motors. 392,471 Alternate current electric motor; William Stanley, Jr., Great Barrington, Mass., assignor to the Westinghouse Electric Company, Pittsburg, Pa.
392,476 Reflecting galvanometer. 392,477 392,478 Galvanometer; Edward Weston, Newark, N. J.
392,490 Commutator bar for dynamo electric machines; Charles E. Billings, Hartford, Ct.
392,513 System of incandescent lighting; Charles Heisler, St. Louis, Mo.
392,573 Method of making electrodes for secondary batteries.
392,574 Electrode for secondary batteries; Chas. H. Thompson, Detroit, Mich., assignor to the Woodward Electrical Company, same place.
392,577 System of electric meters: Alexander Wurts, Pittsburg, Pa., assignor to the Westinghouse Electric Company, same place.



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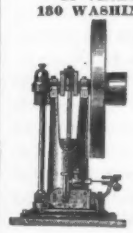

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NOTICE TO THE TRADE.
The injunction restraining me from the manufacture and sale of *PORCELAIN* electric burners for multiple gas lighting, obtained by A. L. Bogart in a suit instituted by him for an alleged infringement of Patent 119,561, *HAVING BEEN DISSOLVED BY REASON OF THE EXPIRATION OF THE SAID PATENT,* I am now making my latest burner of *PORCELAIN* as well as of *LAVA.*
My *FRICTIONAL ELECTRIC MACHINES* embrace the latest improvements in construction and design, and are the only ones now offered to the trade that are protected by *existing* letters patent.
CHARLES H. HINDS,
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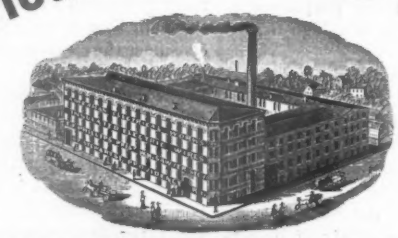
FRESH TESTIMONIALS TO THE SUPERIORITY OF
SIMPLEX WIRE.

THE VIRGINIA ELECTRIC LIGHT & POWER COMPANY, OF RICHMOND, VA.
NEW YORK OFFICE, 63 WALL STREET.
New York, August 21st, 1888.
A. F. MASON, Esq.,
SIMPLEX ELECTRICAL CO.,
Boston, Mass.
Dear Sir:
I have been using the Simplex Wire on a large portion of our lines in Richmond, Va., for the past five months. I have taken daily tests of the insulation during that time. The longest single circuit I have is about five miles, and at no time has the insulation test ever been less than one megohm. I cannot speak too highly of the wire or its insulation. A large portion of it has been run through foliage and trees in the streets, and upon examination a few days ago I failed to find any place where the wire has been abraded by coming into contract with the branches of trees. My instrument does not measure over one meghom, and I cannot tell how much higher the insulation may have measured. One megohm on wires in circuit is euough for me.
Yours very truly,
W. H. COLE, *Superintendent.*

THOMSON-HOUSTON ELECTRIC CO.,
AUGUSTA, GA.
August 12th, 1888.
Dr. A. F. MASON,
SIMPLEX ELECTRICAL COMPANY,
328 Washington St., Boston, Mass.
Dear Sir:
We are using in our arc-lighting circuits about twenty (20) miles of your Simplex T. Z. R. wire.
We have feund the insulation a most perfect protection against moisture and the abrasion of small tree limbs.
Have used your wire in our station, for running through trees, on buildings and porches, under mouldings, etc., and through cellars, and we have never been able to discover a "ground" upon any circuit since our plant was put into operation.
Very truly yours,
JOHN H. WATERMAN.

ADDRESS,
The Simplex Electrical Co.,
328 WASHINGTON STREET, BOSTON, MASS.

EUGENE F. PHILLIPS, PRESIDENT. W. H. SAWYER, SEC'Y AND ELECTRICIAN.
American Electrical Works



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